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# QUANTITY SURVEYING.

7/22/12 9c

# QUANTITY SURVEYING.

FOR THE USE OF

SURVEYORS, ARCHITECTS, ENGINEERS
AND BUILDERS.

By J. LEANING.

*SECOND EDITION.*

NEW YORK PUBLIC LIBRARY

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# PREFACE TO THE FIRST EDITION.

THE nucleus of the following pages appeared in the 'British Architect' in the years 1878 and 1879. These papers have since that publication been revised and much increased in volume.

The change of practice which has been in course of development for some years, and the gradual settlement of a methodical and reasonable system which is not completely explained in any book hitherto published, would seem to warrant the assumption that this manual will not be unwelcome.

The value of orderly procedure cannot easily be overrated, and the writer has endeavoured to indicate various ways by which this can be ensured. The sections on the Order of Taking Off on various principles, Office Practice, the Settlement of Variations, the Treatment of Works of Alteration and Restoration, the Law, the Forms of Bills and Schedules of Prices, and the Examples of Collections and Taking Off will, the writer trusts, prove useful to the student, and tend to increase the number of those men (daily becoming more numerous) who, in the face of adverse opinion and opposing ignorance, hold to the belief that a thing worth doing at all is worth doing well.

# PREFACE TO THE SECOND EDITION.

The system of measuring suggested in this book is for the greater part that adopted by Mr. Thomas M. Rickman, and consequently needs no further recommendation.

The Order of Taking Off, the Preambles of Bills, the Form of Schedule of Prices, and various minor matters, are derived from his practice, and I take the opportunity this second edition affords to express my very grateful acknowledgment of the obligation.

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# QUANTITY SURVEYING.

## CHAPTER I.

## INTRODUCTION.

THE diversity of usage in the profession of quantity surveying (see pp. 11 and 13), and the existence of a number of manuals on the subject, none of which can claim to be complete or entirely reliable,* have led the writer to the conclusion that a treatise which should present the most generally recognised modes of measurement and office practice, and furnish good reasons for the rejection of vicious methods, would prove acceptable to the profession generally, tend to a settlement of disputed modes, and help the establishment of a system which should be generally adopted.

Tables and formulæ have been purposely excluded from this book. The student will find all he may require in Hurst's 'Architectural Surveyor's Handbook.'

The feeling which has been entertained by some architects, that the supplying of quantities for works adds to their cost, is, it is believed, giving place to the impression that, whatever may be the result in that respect, their supply is just and correct in principle.

---

* These for the most part are wanting in system (a very important point in the consideration of the subject), and the information they afford is mixed with facts relating to construction with which every person who professes to take out quantities should be familiar, and which are more properly taught in books which specially treat of practical architecture.

If work is to be well done the quantities are absolutely essential; there is no more fruitful source of bad work than is found in the attempts of builders to recoup themselves for losses from error in their original estimates.

It has moreover become the practice with the majority of builders of good position to refuse to tender unless quantities are supplied.

The honesty of the parties who dispense with quantities in order to keep down the cost of a building may be fairly questioned. The liability to error in pricing an estimate is considerable, and in the cases where quantities are not supplied there is added the further risk of the production of a bill of quantities by persons who, in the majority of cases, have had hardly any special training for the work.

It is a disadvantage incident to the attempt to dispense with quantities that they are under such circumstances liable to be prepared by a surveyor as a speculation, and builders are ready enough to save themselves trouble by accepting them. Some of the evils of such a condition of things are as follows:—The surveyor is not usually the kind of person whom the architect would select. The commission charged is generally larger, and the surveyor not having been nominated by the architect, neither he nor his charges are under the architect's control.

A builder ostensibly tendering without quantities, not unfrequently includes a charge in the amount of his tender, as he commonly employs a surveyor to make his estimate.

The employer should obtain neither more nor less work than is included in the estimate, consequently the quantities should form a part of the contract; and if a stipulation is made in the bill that a priced copy of it shall be deposited with the architect, the prices of which shall form the bases of the rates of any variations, the advantage to the proprietor is usually great. Sometimes it is provided that the deposited bill shall remain sealed, as in some cases in which this has not been done the architect has omitted from the executed work many of the things on which the contractor would have obtained the largest profit. It will be necessary to examine the bill before sealing, to see that all the prices have been extended, casts correct, &c.

The object to be attained is the production of a bill of quantities which shall afford an uniform basis for competition, give the builder all the information that he may require to make his estimate, and be sufficiently clear for any surveyor (not necessarily the one who produced it) to readily adjust variations therefrom.

A prejudice exists in some minds against the elaboration which the more accomplished quantity surveyors affect. This can only reasonably be objected to when the items are of no value. Every item, however small, which has a value should be presented in the bills. The builder may then price them or not, as he may prefer.

The experienced surveyor will, however, to some extent regulate the amount of detail in his bills by the quality of the work.

It may be admitted that with inexperienced builders the increase in the number of items will produce a corresponding increase in the amount of the tenders, but the unworkmanlike results which many sets of quantities present are quite as likely to do so. The adoption of rough methods such as low class builders favour is akin to the complaisance of those persons who when in vulgar company imitate its vulgarities, and is surely unworthy of building experts, who should rather be arbiters than followers of a fashion.

The systems of measurement in various parts of the country are very different. The adoption of a code of rules by the Manchester Society of Architects, which differs in many respects from the best London practice, is to be deplored, for though some differences are at present unavoidable (local customs being difficult to change), yet united action on the part of that and other societies would have resulted in the removal of some of the divergencies if they had thought it advisable, which it is presumed they did not. One recognised system of measurement throughout the kingdom should certainly be the object which the profession should strive to realise.

## ESTIMATE, WOODCOTE.

*Provisions.*

Burke's mosaic paving as desd.

1 3
7 4
11 5
4 2
6 2
95 4
125 8
14 yds.

Wilkinson's ct. paving.

80 9
169 0
435 11
685 8
76 yds. 2 ft.

Provide for carving two stone tablets, £15.

Provide for carving corbels at 10/ each.

2
14
5
21

Provide for *two* W. I. finials and fixing £8.

*Excavator.*

Supl.

Excavation 9 ft. deep to general surface, sepg. vegetable soil, and wheeling and depg. where directed at an average distance of 2 runs.

4376 8
486 yds. 3 ft.

Cube.

Excavation to basement trenches, and wheel a. b.

17 6
78 0
272 6
54 2
422 2
15 yds. 17 ft.

Cube.

Excavation to surface trenches, and wheel a. b.

587 6
565 11
15 0
22 0
5 8
16 6
1212 7
44 yds. 25 ft.

Do. P. F. and R.

587 6
565 11
15 0
22 0
5 8
16 6
1212 7
44 yds. 25 ft.

*Run* trench for pipe.

20 0
25 0
45 0
15 yds.

Cube.

Concrete as described in trenches.

587 6
565 11
15 0
1168 5
43 yds. 7 ft.

Supl.

Concrete 9 in. thick, levelled to falls to receive paving.

455 6
190 4
645 10
71 yds. 7 ft.

*January* 1886.

*Bricklayer.*

*Brickwork in mortar.*

| 1 B. | | 1½ B. | | Deduct. 1 B. | | Deduct. 1½ B. | |
|---|---|---|---|---|---|---|---|
| 78 | 4 | 39 | 2 | 43 | 0 | 12 | 0 |
| 792 | 2 | 87 | 1 | 114 | 10 | 7 | 6 |
| 87 | 1 | 493 | 4 | 93 | 3 | 13 | 6 |
| 1259 | 6 | 1210 | 9 | 70 | 9 | 6 | 0 |
| 2 | 0 | 204 | 7 | 39 | 11 | 36 | 0 |
| 50 | 0 | 1 | 0 | 59 | 10 | | |
| 2269 | 1 | 2035 | 11 | 421 | 7 | 75 | 0 |
| 421 | 7 | 75 | 0 | | | | |
| 1847 | 6 | 1960 | 11 | | | | |
| 615 | 10 | 1231 | 8 | | | | |
| 1231 | 8 | 3192 | 7 | | | | |

11 rods 201 ft.

| ½ B. sleeper walls built honey-comb. | |
|---|---|
| 260 | 4 |
| 108 | 6 |
| 368 | 10 |

| Brick vaulting in two ½ B. rings in ct. | |
|---|---|
| 73 | 0 |
| 42 | 9 |
| 115 | 9 |

| Damp-proof courses ½ in. thick of Seyssel asphalte. | |
|---|---|
| 761 | 9 |
| 6 | 0 |
| 48 | 11 |
| 5 | 11 |
| 822 | 7 |

| ½ B. partn. in ct. | | Deduct. | |
|---|---|---|---|
| 54 | 9 | | |
| 96 | 3 | | |
| 56 | 11 | 23 | 7 |
| 133 | 3 | 19 | 11 |
| | | 43 | 10 |
| 341 | 2 | | |
| 87 | 4 | 87 | 4 |
| 253 | 10 | | |

| Ro. cutting on B. | |
|---|---|
| 29 | 6 |
| 43 | 9 |
| 33 | 6 |
| 106 | 9 |

| Fair struck joint and 2ce L.W. | |
|---|---|
| 804 | 0 |
| 61 | 8 |
| 865 | 8 |

96 yds. 2 ft.

| ½ B. trimmer arch in ct. and levelling up w. concrete. | |
|---|---|
| 12 | 3 |
| 7 | 0 |
| 13 | 2 |
| 82 | 5 |

To take off quantities with facility, the surveyor should have a thorough knowledge of construction, of mensuration of superficies and solids, a knowledge of the architectural styles, their characteristic differences, and the technical names of their parts. He should be well acquainted with the provisions of the Building Act and bye-laws of the Metropolis, or of the locality in which the work is to be done. He will be practically the technical adviser of the architect upon all matters of construction and detail.

The general course of procedure in the preparation of a set of quantities is the following:—

*Taking off*, i.e. measuring drawings to scale and making notes of the dimensions on paper ruled as below.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 17 4<br>3 3<br>2 0 | 112 8 | Excavn. to surface trenches and removing a. b.<br>N. wall servants' hall | | | | | N. of coals 10 9<br>E. of do. .. 23 3<br>S. of do. .. 6 4<br>W. of do... 5 2<br>S. of do. .. 27 4<br>E. of S. hall 16 0<br>88 10 |
| | 17 4<br>3 3<br>9 | 42 3 | Do. P. F. & R. | | 88 10<br>6 | 44 5 | 1¾ B. | foots 1 B. walls |

*Squaring the dimensions*, i.e. calculating the products of the dimensions and writing the results in the squaring column. Squarer also checks the "wastes."

*Abstracting*, i.e. transferring the results and descriptions from the dimension sheets to the abstract on pp. 4 and 5 in the order of the proposed bill.

The vertical lines are frequently disregarded in practice so far as the writing of headings is concerned, but their adoption is essential to the columns of figures.

*Reducing the abstracts*, i.e. casting the columns of figures and reducing them to the denominations in common use as yards squares.

*Billing*, i.e. transferring in the customary order to paper ruled as below, which, if abstracting is properly done, will be the order of the abstract, the items therein.

| Yds. | Ft. | Ins. | | Continued. | £ | | |
|---|---|---|---|---|---|---|---|
| 335 | .. | .. | supl. | Excavate to general surface about 12 in. deep, (averaged) wheel and deposit within an average distance of 5 runs. | | | |
| 153 | .. | .. | cube | Do. to surface trenches and wheeling and depositing as before. | | | |

Taking off is seldom checked, but should be.

Abstracting is checked by a clerk, who ticks in red every item from the dimensions. Billing is checked in the same manner.

There are a few general rules which it will be advantageous to remember in the preparation of quantities.

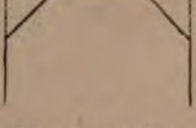
The adoption of one unvarying system facilitates the identification of dimensions, when the whole of the collateral circumstances are forgotten. Take off the dimensions always in the same order. This is the surest protection from error.

When dimensions in different drawings do not agree, those of plan should always be preferred.

Take always first, the length; second, the breadth; third, the depth. In collecting dimensions begin at one particular angle of the building, and proceed always in the same direction from that point in succeeding collections.

Prefer always to take the largest dimensions you can find, and make deductions afterwards for voids, "wants," &c., to taking a quantity piece by piece; the former plan better preserves you from the risk of the quantities being short.

FIG. 1.



Always clearly distinguish in your dimensions between voids and wants. The latter are portions of work measured in excess; as when one measures an area square for convenience, and deducts a triangle from it, as sketch; spaces enclosed by dotted lines indicate wants.

Keep all the dimensions as clear and distinct as possible; do not squeeze dimensions together in order to spare paper; closeness of writing is a frequent cause of error.

In all cases clearly describe the position of each item of the work, keeping such description well to the right-hand edge of your paper.

Do not use a rule which has several scales on it; if an eighth scale, let it have nothing but an eighth scale on both edges; if a quarter, nothing but a quarter. Errors have been often made by applying to the drawing the wrong edge of a rule with various scales on it.

When a dimension is made up by the addition of several smaller dimensions, show the addition on the right-hand side of the description column (on "waste," as it is called), or (though this is not so well) write after the description of the work, "collected." Thus—

| | | | | | |
|---|---|---|---|---|---|
| | 61 0 | | | 25 0 | East Wall. |
| | 10 0 | | 1½ B. | 5 0 | South ditto. |
| | —— | | Still Room. | 25 0 | West ditto. |
| | | | | 6 0 | North ditto. |
| or, | 61 0 | | | —— | |
| | 10 0 | | 1½ B. | 61 0 | |
| | —— | | | | |
| | | | Still Room.<br>Collected. | | |

Before commencing your measurement inquire as to what details are to be supplied to you, as, if not, you will possibly find when you have well advanced with your work on the small-scale drawings, that details furnished will render parts of it useless.

Carefully examine the drawings and compare them to see whether the plans and sections agree as to thickness of walls, heights, &c.

Read the specification through, making notes of any descriptions which appear doubtful, or of any omissions which occur to you.

Find out, if possible, the points of the compass, as walls are more conveniently described as north, south, &c., than in any other way. The writer prefers, in default of the ability to discover the real north point, to treat the plan in question like a map, calling the top north, &c., and though this conclusion may be wrong, it is to be looked upon as a mere expedient which facilitates his work. A note on his dimensions stating that he has assumed this will insure him from misconstruction in the future.

If the drawings have not been figured, the surveyor will save himself much trouble if, before he commences his dimensions, he figures in pencil the lengths and breadths of rooms, the lengths of external walls, and the heights of the stories; and during the process of taking off, when you calculate a dimension, write it on the drawing in pencil—you may require it again.

If the bedrooms have not been numbered, or if a system of numbering has not been carried by the architect through the whole building, number them in pencil consecutively, 1, 2, 3, 4, &c.; make a rough tracing of the arrangement and the numbers to preserve with the dimensions. This will save labour in the description of the situation of the rooms. These figures are simply for the surveyor's own use.

Make notes of any alterations of arrangement that may be adopted in the course of taking off, and if not easily described, make tracings of them, or draw them in pencil on the original drawing.

When a building appears naturally to divide itself into two (or more) separate blocks, keep the dimensions of each block distinct, following the same order of taking off, and the same entire process, as if each were a separate building. The parts which repeat may then be simply doubled, but the figures used for this purpose (the "twicing") should be red, to show that the doubling is not a part of the same block.

When taking off oriels, bays, turrets, &c., in stone or terra-cotta, the work will be easier if the surveyor makes a plan of each course on tracing paper.

Measure all detached buildings, outbuildings, or boundary walls last, and keep the dimensions relating to them separate, as the whole or part of them are not unfrequently omitted in course of erection, and such alterations can be much more easily adjusted if the dimensions be kept distinct.

Do not describe unnecessary things, such as the width of the rails or stiles of a door, unless there is something unusual about them.

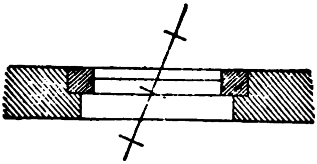
In taking off dimensions, collect lengths as much as possible; time is thus saved in the squaring and abstracting. The more expert the measurer the fewer dimensions does he take off to produce the result.

In measuring finishings, refer to the dimensions of the deductions of openings; by this means another check takes place, and the same order being maintained in both, reference is easier.

In altering dimensions after the squaring has been done, take the precaution of crossing out the figures in the squaring column, and besides this put a mark in pencil in the margin to attract attention. If an alteration is made after the dimensions are abstracted, the whole process of altering should be done at once by two persons, one making the alteration and the other checking it.

In "taking off" openings in a large building it is absolutely necessary, and it is in the case of all buildings (large or small) advisable, to put a mark on the drawings (in pencil) showing which openings have been dealt with; a good plan is as follows (Fig. 2):—A line through the opening signifies opening deducted; a shorter line across it on outside of wall, facings deducted; line on inside of wall across first line, plastering deducted; a line between two last, finishings measured. By these means any doubt of the kind can be readily solved.

FIG. 2.



Write the title of the work at the top left-hand corner of every sheet of dimensions; the danger of mixture with dimensions of other work is thus avoided.

Number every column of dimensions. This is handier for reference than numbering each page.

Write an index when all is taken off, which may be fastened to the front of the set of dimensions, thus:—

| | | |
|---|---|---|
| Cube of Building .. .. | 1 | |
| D. S. Fees .. .. .. | 2 | |
| Surface Digging .. .. | 2 | &c. |

If you bind the papers when the work is finished, the following order is a reasonable one:—Specification, Dimensions, Bills, Variations, Memoranda, Correspondence.

The practice of "taking off" by a surveyor without any check is frequent and objectionable. The dimensions should always be examined item by item with the drawings by another surveyor. When circumstances prevent this, the surveyor should himself look through the dimensions after several days have elapsed; he will then probably discover errors or inconsistencies which will more than repay him for the trouble thus taken.

There are various methods of "taking off" quantities; all, except for unimportant differences, referable to the two following categories:—(*a*) Taking off each trade separately, as the whole of the excavation, the whole of the brickwork, &c., keeping each trade separate in the dimensions. (*b*) Taking off the work in two divisions—1st, the construction or carcase, comprising excavator, bricklayer, mason, slater, carpenter, &c.; 2nd, the finishings, comprising joiner, ironmonger, plasterer, glazier, painter, paperhanger, &c.

The former method (*a*) is now but little used. Its advantages are the comparatively few dimensions, and the consequent saving of labour in squaring and abstracting them. Its disadvantage is the separation in the dimensions of the items of a particular piece of work so completely that in the adjustment of an account involving omissions the work of picking out each item is often considerable, and liable to be incomplete.

The latter method (*b*) is the one which has been adopted in this work. The labour is certainly greater, but the superior clearness obtained in the event of variations much more than compensates for the additional labour at first.

Method (*a*) is sometimes used when it is desired to write the bills immediately after the taking off, and before the whole of the dimensions are completed.

It frequently happens that another dimension occurs exactly like one which has been previously taken. It is then convenient either to "dot it on," as it is called, or to "times" the first dimension. The first dimension being 2/5 feet, the "timesing" would be thus, 2/2/5 feet, and the dotting on thus, 2·2/5 feet, in this case equivalent. The process requires, in either case, great care, as it is a frequent cause of error. In all cases where a dimension is dotted on, make a reference in the dimensions, where it would properly be, to the column to which it is added, and add a description of its position at that part of the dimensions where it is dotted on. It will sometimes be convenient to dot on ½, ⅓, or ¼ times, &c.

A precaution sometimes taken, if the surveyor has a series of dimensions which will require "timesing," is to put the number or some mark in pencil opposite the first of the series, putting the number in ink to the whole of the items after they are taken off. This will be seen by the abstractor, if the surveyor, taking off, should forget to attach the number, and an error will thus be avoided. Always finish a series before you "times" it.

It is generally admitted, and well to remember, that quantities prepared by inexperienced surveyors are deficient in quantity and in completeness of description.

Keep in mind the principle of making one collection of dimensions serve for several kinds of work. In many instances one collection will be sufficient for excavation, concrete, footings, and walls; and, with slight modification, one for skirting, plastering, cornices; one for eaves fillet, cutting to eaves or extra slating, fascia, and in many more cases which the student may, with little thought, discover for himself.

Much labour may be saved by averaging. Care must be taken that the things averaged are of the same relative value, and that the result arrived at is truly an average. Always show the process "on waste." See remarks on averaging, section "Abstracting," p. 122.

It will not unfrequently occur that a result obtained by elaborate labour will be further from a correct one than that produced by averaging; as a general rule, it may be assumed that the less detail involved in the process the less liability to error.

As the surveyor proceeds, he should run a vertical line in pencil through each clause of the specification as it is dealt with, and he will save time if he corrects each clause as soon as he has finished the dimensions relating to it; but this is not always practicable. Always take off in your own order, not that of specification. But the most convenient practice when architect and quantity surveyor know each other's ways, is for the latter to write the specification after the quantities have been prepared; the architect furnishing notes of any special arrangements he may require.

In measuring triangles, the dimensions are more easily identified if, instead of halving the base or perpendicular dimension of the triangle, you enter both in full, and put ½ in front of them, thus:—

| | | | | |
|---|---|---|---|---|
| ½/ | 20 0<br>10 0 | 100 0 | 1 B. | Gable. |
| in | stead of<br>20 0<br>5 0 | 100 0 | 1 B. | Gable. |

For the method of writing circles and semicircles see p. 39.

The following are the methods of writing dimensions of various surfaces and solidities. The 1 foot dimension is introduced to identify such as are cubic dimensions in abstracting.

The solidity of a pyramid 5 feet base, 15 feet vertical height:—

| | | | | |
|---|---|---|---|---|
| *(Base)*.. .. .. .. .. ..<br>*(Perpendicular height)* .. .. | ⅓ | {5 0<br>{5 0<br>15 0 | 125 0 | spire |

The surface of a pyramid is treated as a number of triangles.

The solidity of a cone 5 feet diameter at base, 15 feet vertical height:—

| | | | | |
|---|---|---|---|---|
| (*Base*) .. .. .. .. .. .. | ⅓ | <5 0> | | |
| | | 1 0 | | |
| (*Perpendicular height*) .. .. | | 15 0 | 98 2 | |
| | | | | spire |

The surface of a cone 5 feet diameter at base, 15 feet vertical height, 15 feet 10 inches slant height:—

| | | | | |
|---|---|---|---|---|
| (*Circumference*) .. .. .. .. | ½ | 15 8 | | |
| (*Slant height*) .. .. .. .. | | 15 10 | 124 0 | |
| | | | | spire |

The solidity of a sphere 5 feet diameter:—

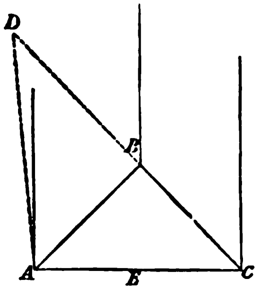
| | | | | |
|---|---|---|---|---|
| (*Base of circumscribing cylinder*) | ⅔ | <5 0> | | |
| | | 1 0 | | |
| (*Height of ditto*) .. .. .. | | 5 0 | 65 6 | |

The surface of a sphere 5 feet diameter:—

| | | | | |
|---|---|---|---|---|
| (*Circumference*) .. .. .. .. | | 15 8 | | |
| (*Height of circumscribing cylinder*) | | 5 0 | 78 4 | |

The usual method of measuring the length of hip rafter is as follows:—A B C is a plan of the hipped end of a roof; B D is the vertical height drawn at right angles to A B; A D is the length of hip. Observe that if the roof plane is at an angle of 45° with the horizon, E B and B D will be equal, and you may take your dimension from the plan without reference to the section.

FIG. 3.



To avoid repetition, and to show that an item is to be abstracted in two operations, the dimensions are written as follows:—

| | | |
|---|---|---|
| 4 0<br>3 0 | 12 0 | B. P. P. ground O. S.<br>in 1 square.<br>and<br>B. P. P. ground O. S. and cut to shapes.<br>in 1 square. |

When dimensions are given, say if in clear, as "9 inches by 9 inches by 12 inches all in clear."

A general description of the materials, &c. (see section "Billing," p. 138), to form the preamble to each trade, may be written in the dimensions, or may be written as a heading to the bill direct from the specification; and this latter course is best, as much writing in the dimensions is thus saved. For items involving a long description refer to specification thus: "No. 1 Dresser as described. See p. 30 specification." The preliminary bill may always be written direct from the specification. Head the dimensions with a description of the work, the place, the name of the proprietor, the name of the architect, and the date thus:—

Estimate for the erection of a house and offices at Godalming, in the county of Surrey, for John Smith, Esq. (with Mr. ......., Surveyor).

William Brown, Esq., Architect,
March 1878. 2, Fenchurch Chambers, E.C.

If the quantities are prepared jointly with another surveyor, insert the name as shown in parenthesis.

Some surveyors commence their dimensions with the cubic content of the building. A number of such calculations for different buildings are very useful data for the comparison of prices.

The letters a.b. (as before) or the words "as last" will frequently save repetitions of descriptions, but use these with care.

Writing may often be saved by marking a previous item with a letter, thus:—

| | | |
|---|---|---|
| 3 0<br>7 0 | 21 0 | 2¼ in. door as A col. 48 dims. |

Before beginning to "take off," head a sheet of paper with the name of the work, and the word "Queries"; rule a vertical line down the middle of the sheet, write your queries on the one side of the line as they occur in the course of your work, leaving the other half of your paper blank for the answers, and write these down as you obtain them either by further inspection of drawings and specification or inquiry of the architect.

Do not trust to your memory. If you discover that you have forgotten to take an item in its proper order do it on the first opportunity; nothing contributes so much to a clear head as the avoidance of an accumulation of small items of arrears of work.

All the items which will be found in the different following sections could not apply to one building, they are merely introduced for the purpose of clearly showing the system.

After the quantities have been taken off, read through the specification, to see if all has been taken.

When the quantities are required for a large building, and it is found necessary for a number of men to take off at one time, it is the usual practice to make several sets of tracings (one for each man) so that the inevitable interruption of each other's work, when several are working on the same set of drawings, may be avoided. The expense thus incurred is amply repaid.

When more than one person is engaged in taking off a set of quantities the liability to error is much increased, as each man is apt to assume that one or the other has taken off a particular section of the work, and the way to obviate the risk is for one man to take the responsibility, and supervise this. Supervisor should take off the painting from the dimensions of the whole work, when they are complete, and he will discover mistakes and discrepancies, which he can remedy. If the necessity of checking taking off should arise, and he cannot follow the dimensions, let him take it off in his own way and compare the results.

Each man engaged should make any requisite notes for the guidance of the others.

Mere notes should be written across both dimension and description columns, not confined to the description column.

Future reference to the dimensions will be much easier if headings are written in the body of the dimensions wherever the work appears to naturally divide itself, thus: "Main roof," "Roof of laundry," Fittings," &c.; the indexing will also be facilitated by this practice.

Much time may be saved by employing a *careful* clerk to write the dimensions to your dictation. Keep a watchful eye on the page as it is written. When you desire to have a series of dimensions added together, begin with the words "on waste," and when the clerk has finished the series use the word "dimension," the clerk will then add them together, and write the result in the dimensions column.

The received method of dictating the following, 2/3/7·0 1″ × 1″ deal fillet rough, is seven feet three times twice inch by inch deal fillet rough.

When in taking off you make a sudden change in the thickness of work of the same description, underline it thus: "1½ four panel square door."

Items should not leave the reader in doubt as to whether part of the work is included in the prices or not. To avoid this, use the words, "elsewhere taken," thus: "1½ inch Honduras mahogany w.c. seat fixed with brass screws and cups *elsewhere taken.*" It will sometimes happen that there are certain things which the surveyor is compelled by circumstances to take, but which he knows must of necessity be altered in execution. If the surveyor keeps a list of these items he will find it an assistance when he is required to settle variations.

Work in narrow widths, small quantities, or short lengths, should be so described and kept separate; but where the quantity in the bill is so small as to speak for itself, the specific words "in small quantities" need not be used. Such work should always be billed in feet.

The loss and inconvenience which surveyors have sometimes suffered by injury to drawings by ink, fire, &c., have led many to insure them against such damage. The practice is a good one, and may preserve surveyor from heavy loss. Some surveyors refuse to prepare quantities from drawings in pencil; if you do, you should retain tracings of them, or have them finished by the architect's clerk in your own office; an inadvertent alteration may be important.

## CHAPTER II.

### ORDER OF TAKING OFF.

THE items in this section are furnished as a general guide, and do not profess to comprise everything which arises in the course of practice.

The principle to be observed in "taking off" is the avoidance of the loss of time, liability to error, and uncertainty as to the stage of your work at which you have arrived, which is a consequence of mixing things up too much. The arrangement of the following list is believed to meet some of these objections.

In looking through dimensions some time after they have been taken off, be very careful to make no alteration without mature consideration, for although a dimension may appear at first sight to be wrong, it will most frequently prove on further thought to be correct.

Many of the arrangements suggested in the following pages are applicable only to a large work, in a small one they would only produce confusion in the guise of order.

It will generally be necessary for the surveyor to visit the site of the proposed work. In cases of new buildings, he should discover if possible whether sand or gravel suitable for the works can be obtained on the ground; should observe the access, and if exceptionally difficult, should describe it in the preliminary bill; should note any flues of adjoining buildings that may require raising, any parts of abutting property exposed by the pulling down of party walls or boundary walls, necessitating inclosure by contractor or special shoring; should measure the lengths of frontage if paved, and describe as "... feet run. Take up street paving and deposit and relay, and make good at completion, or pay parish authorities for so doing." In cases of alterations to old buildings, see if temporary floors are required (sometimes necessary when business is carried on during construction of a new floor); temporary ceilings or roofs (when new stories are constructed over occupied premises); temporary inclosures (to separate occupied part of building from part to be altered). In all cases measure the quantity and describe. See what arrangements are necessary for temporary supply of gas or water, where these are interfered with. Note what work requires casing and protecting, as stone staircases, chimneypieces, &c.

Your visit to the building is better deferred until you have taken off all the work which can be measured from the drawings, you can then settle all the points you have noted, and will better know what to look for.

In the preparation of quantities for the completion of buildings in carcase, particular care must be exercised in the observation of the condition of the work, much of which is left in various stages of progress. See that your quantities include cleaning down all the work, both new and old; renewing work which has possibly already failed; removal of hoarding, making good paving up to building frontage, &c. If a hoarding is already fixed, state what alteration will be required to adapt it to contractor's purpose.

### CARCASE.

Area for district surveyor's fee, if in Metropolitan area.

Any work to party-walls complete.

Digging to surface.

Ditto to basement.

Ditto filled in and rammed.

Ditto to basement trenches. External walls. *Collect the lengths a.*

Concrete to basement trenches. External walls. *Collection a.*

Cases will sometimes arise in which it will be the simplest course to measure one wall at a time, beginning with the footings and completing it to the top.

Footings. External walls. *Collection a.*

External walls up to a certain level (say ground floor). *Collection a.*

Measure everything up to one level if possible, before taking any work above that level.

Incidental cuttings are best taken as they occur. Also preparation of old walls to receive new. Cutting and binding new work to old, &c.

Digging to basement trenches. Internal walls. *Collection b.*

Concrete to trenches. Internal walls. *Collection b.*

Footings. Internal walls. *Collection b.*

Internal walls up to a certain level (say ground floor). *Collection b.*

Digging to surface trenches. External walls, i. e. walls where there is no basement. *Collection c.*

Concrete to surface trenches. External walls. *Collection c.*

Footings. External walls. *Collection c.*

Walls, external, up to a certain level (say ground floor). *Collection c.*

Digging to surface trenches. Internal walls. *Collection d.*

Concrete to surface trenches. Internal walls. *Collection d.*

Footings. Internal walls. *Collection d.*

Walls, internal, up to a certain level (say ground floor). *Collection d.*

Strutting and planking to basement.

Strutting and planking to trenches. *See collections of walls.*

Damp-proof course. See *collections of walls.*

External walls from last level up to first floor level. *See former collections.*

Internal walls from last level up to first floor level. *See former collections.*

External walls, from first floor level, floor by floor to top.

Brick fronts to dormers and gables.

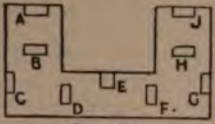
Internal walls, from first floor level, floor by floor to top.

Deduct wants as they occur.

Projections of chimney breasts, *one at a time*, commencing with concrete and finishing with shafts.

If you follow these up from the ground, tracing the flues, you are sure to get your breasts of the right size.

When *the building is large*, writing will be saved by making a sketch on the dimensions of the disposition of the chimney stacks, and referring to them by letters thus:—



PLAN.

Hoop iron bond. *Collect. See collections of walls.*

Brickwork extra only in cement for last.

**FIRES—**

Beginning with topmost story. *Deduct* opening.

*All the openings on one story of similar width and depth may be collected.*

*Add* chimney-bars. *Collect.*

Segmental arches. "

Flues, parget, and core. *Collect.*

Soot doors and "sweeping" flues.

Fender walls. *Collect.*

Hearths and back-hearths. *Collect.*

Notchings for chimneypieces. *Collect.*

Chimney-pots or chimney moulds or bafflers. *Collect.*

Stoves and setting.

Coppers and setting.

Copper-lids.

Centering to trimmers. *Collect.*

Trimmer arch and levelling up with concrete. *Collect.*

Skewback cutting. *Collect.*

Feather-edged springer. *Collect.*

Filleting soffits of trimmers.

Chimneypieces.

If a provision for stoves for chimneypieces, make a collection as shown in examples of collections.

If setting is not in provision take particulars of materials for setting only.

### INTERNAL OPENINGS—

*To be referred to when taking off the joinery.*

Beginning with topmost story.

*Deduct* brickwork. *Collect or average the openings where possible.*

*Add* lintel. *Collect.*

Relieving arch (or segmental arch and centering where no lintel).

Wood bricks or pads.

Steps or thresholds (if any). *Collect the various widths.*

Ends cut and pinned.

Frame bed and point (if any).

Iron dowels and mortises.

### FACINGS—*Collect.*

Facings to chimney-stacks, taking stone dressings, if any, at same time, also extra projecting brickwork.

Gable copings (stone or brick), finials, kneelers, bonders.

General facings. *Collect the lengths.*

Strings and brick cornices, and extra brickwork for their projection, quoins, plinths, tablets, niches.

Excavation, brickwork, and facing for extra thickness of walls to form plinths, &c.

Ashlar facing and general stonework, or external cement work, except to openings.

Terra-cotta, if any, except to openings of doors and windows.

### EXTERNAL OPENINGS—

Beginning with topmost story and floor by floor.

*Deduct* brickwork.

*Deduct* facings.

*Add* jambs, stone or brick, mullions, transoms, lintels, centering, strutting.

Arches, cutting to facings, rough cutting. *The openings may often be averaged.*

Sill, fair ends, window sills made up and pointed.

Lintel. *Collect.*

Relieving arch.

Frame bedded and pointed or screeded.

Wood bricks or pads.

Stone steps, including brickwork supporting them, and the landings and railings to external flights taken with the doorways to which they lead.

Ends cut and pinned.

Areas complete in all trades, with the basement windows. *Collect the walls of areas where possible.*

### Pavings—

Beginning with basement.

Hard dry rubbish.

Concrete.

Cement-floated face.

Pavings of all kinds.

Iron joists connected with vaulting.

Ends cut and pinned.

Templates.

Centering and horsing to vaulting.

Vaulting.

Cutting.

Raking out and pointing to soffits.

Stone staircases complete in all trades.

### Ground Floors—

Brickwork of oversailing to receive plates. *Collect.*

Excavation for sleeper walls. *Collection e.*
Concrete for sleeper walls. *Collection e.*
Footings for sleeper walls. *Collection e.*
Remaining brickwork for sleeper walls. *Collection e.*
Extra thickness of walls to receive plates.
Excavation, footings, remaining brickwork. *Collection f.*
Damp-proof course.
Plates. *Collection f.*
Joists. ,,

### Upper Floors—

Templates, felt or lead pads, girders, wood or iron.
Flitches.
Tension rods, &c.
Bolts.
Ends cut and pinned.
Joists. *Collect.*
Trimmers. *Collect.*
Deductions of joists for voids.
Strutting. *Collect.*
Sound-boarding and pugging.

### Partitions—

Floor by floor, beginning with topmost story.
Heads and sills. *Collect.*
Interties. *Collect.*
Posts. ,,
Quarters. ,,
Braces. ,,
Bridging-pieces. *Collect*
Ironwork in straps and bolts.
Brick-nogged partitions. *Collect.*
Deduct openings.
Heads and sills. *Collect.*
Quarters. ,,
Nogging-pieces. ,,

### ROOFS—

Templates.
Felt or lead pads.
*Trusses.* Tie beams.
Principal rafters.
King or Queen posts.
Struts.
Collars.
Circular ribs.
Ironwork and fixing.
Straps.
Bolts.
Gibs and keys.
King or Queen heads.
Hoisting and fixing roof trusses.
Templates.
Ends cut and pinned.
Purlins. *Collect.*
Cleats.
Scarfings and bolts.
Plates. *Collect.*
Ridges ,,
Rough chamfer on fir.
Ridge rolls. *Collect.*
Hips. *Collect.*
Hip rolls. ,,
Rough chamfer on fir. *Collect.*
Valleys. *Collect.*
Dragon pieces and bolts.
Rafters. *Collect.*
Sprockets. ,,
Cut and shaped and wrought ends to rafters.
Eaves boards. *Collect.*
Eaves fillet. ,,
Tilting fillet. ,,
Battens or boarding.
Cuttings to ditto. *Collect.*
Felt.
Slating or tiling.
Cuttings.
Allowance for eaves, hips, valleys.
Tile or slate ridges. *Collect.*
Hip or valley tiles. ,,
Gutter boards and bearers.

Rebated drips.
Short lengths of roll.
Lead to gutters.
Cesspools. *Collect.*
Extra labour and solder to cesspools.
Socket pipes from ditto.
Perforations in brickwork for ditto.
Copper wire or galvanised iron covers to cesspools.
Flashings to gutters. *Collection g.*
Raking out, wedging, and pointing. *Collection g.*
Fillets to secret gutters. *Collection h.*
Lead to ditto. *Collection h.*
Flashings to ditto. "
Raking out, wedging, and pointing. *Collection h.*
Valley boards. *Collection j.*
Chamfered fillets to valleys. *Collection j.*
Tilting fillets. *Collection j.*
Lead to ditto. "
Lead to hips.
Bossed ends to rolls. *Collect.*
Bossing to intersection of ridges.
Lead headed nails.
Soldered dots.
Close cut mitred hip to slating. *Collection k.*
Fillets for dressing lead over. *Collection k.*
Lead to secret gutters. *Collection k.*

**CHIMNEYS—**

*Deduct* tiling or slating, and boarding or battens, and felt.
*Add* for cuttings to ditto.
Chimney gutters. *Collection l.*
Flashing boards. "
Tilting fillets. "
Lead to gutters, cover flashings, aprons, stepped flashings. *Collect.*
Rake out, wedge, and point, flashings. *Collect.*

**DORMERS WITH BRICK FRONTS—**

All trades except finishings and the brickwork, which last is measured with general brickwork.
*Deduct* slating or tiling, and boarding or battens, and felt.
*Add* plates. *Collect.*
Valleys or footing-pieces, valley boards, valley fillets. *Collect.*
Lead to valleys or valley tiles, cutting to boarding or battens and to tiling.
Trimmers.
*Deduct* rafters.
*Add* ridge. *Collection m.*
Ridge roll. "
Chamfer on fir. *Collection m.*
Lead to roll. "
Bossed ends to ditto.
Lead soakers.
Rafters. *Collect.*
Eaves board. "
Tilting fillet. "
Sprockets. "
Cut and wrought ends to rafters.
Tiling or slating.
Extra tiling or slating for eaves. *Collect.*
Tile or slate ridge. *Collect.*
Boarding and backings to cheeks.
Cutting to boarding. *Collect.*
Lead or other covering to cheeks.
Copper nailing. *Collect.*
Brass screws and soldered dots and sinkings in boarding.
Flashings. *Collection n.*
Raking out, wedging, and pointing ditto. *Collection n.*

**CEILING JOISTS—**

Plates. *Collect.*
Ceiling joists. "
Stretchers. "
Hangers. "

Ways in roofs. *Collect.*
Traps in ceilings complete.
Ladders.

**TRAPS—**

*Deduct* slating or tiling, battens or boarding, felt.
*Add* slating or tiling for cuttings.
Boarding or battens for ditto.
Trap and rims.
Lead covering.
Copper nailing. *Collect.*
Bossed angles.
Fastenings.
Curb, and labour on same.
Lead covering to curb.
Copper nailing. *Collect.*
Flashing boards. ”
Tilting fillets. ”
Gutter board and bearers.
Lead to gutter.
*Deduct* plastering.
*Add* plaster quirk. *Collect.*

**LANTERN LIGHTS, &c.—**

These vary greatly in detail, but generally as to traps and dormers.
Snow boards. *Collect.*
"Cat" or roof ladders.
General flashings and stepped flashings of roof. *Collect.*
Rake out, wedge, and point flashings. *Collect.*

**EAVES GUTTERS AND RAIN-WATER PIPES—**

Fascias.
Eaves gutters. *Collect.*
Stopped ends. ”
Angles. ”
Outlets. ”
Covers to outlets. ”
Rain-water pipes. ”
Swan necks. *Collect.*
Heads. ”
Shoes. ”
Tee pieces. ”
Bends. ”
Plinth bends. ”
Loose bands.
Cuttings to brick or stone strings. *Collect.*
Covers to heads. *Collect.*
Connections with drain. *Collect.*

**WATER SUPPLY—**

Well.
Bearers to cisterns, iron or wood.
Templates.
Ends cut and pin.
Cisterns of iron.
Cisterns of wood.
Lead lining.
Soldered angle. *Collect.*
Copper nailing. ”
Standing waste. ”
Brass washer and waste, and fly nut.
Lead waste.
Connection with drain.
Boiler screw and overflow.
Perforations in brick or tile.
Cistern covers.
Joiner attend plumber for each cistern.
Perforations in brickwork for pipe.
Chase for pipe, pipe casing, plaster quirk. *Collect.*

**SINKS—**

Stone or stoneware.
Bearers.
Perforations for traps.
Cutting and pinning sink to brickwork.
Trap.
Waste.

Connection of waste with drain.
Perforations in brickwork for pipes.
Joiner attend plumber to sink.

**WOODEN SINKS—**

Bearers.
Ends cut and pin.
Woodwork of sink.
Lead lining.
Soldered angle. *Collect.*
Copper nailing. „
Wooden capping.
Brass grate and plug, and rim and soldering.
Lead waste.
Lead trap and cap and lining.
Connection with drain.
Chase. *Collect.*
Pipe casing. *Collect.*
Plaster quirk. „
Perforations in brickwork and making good.
Deal top, if any.
Perforation for sink.
Enclosure of space beneath, complete.
Draining boards.
Covering with lead.
Copper nailing. *Collect.*
Joiner attend plumber to sink.

**LAVATORIES—**

Apparatus and valves complete, or rough deal tops and bearers.
Perforation for basin.
Slate or marble top, and perforation.
Rounded or moulded edge. *Collect.*
Skirting and angles. *Collect.*
Basin and washer, plug and chain.
Waste.
Trap.
Connection with drain.
Overflow pipe and joints.
*Chase. Collect.*
Pipe casing. *Collect.*
Perforation in brickwork for pipe.
Enclosure of space beneath, complete.
Shelves and bearers.
Joiner attend plumber to lavatory.

**BATHS—**

Deal cradle for bath.
Bath and valves.
Waste and joints.
Connection with drain,
Or with another pipe, as the case may be.
Perforations for pipes.
Pipe for overflow and joints.
Lead safe.
Joiner attend plumber to safe.
Lengths, bossed angle.
Pipe for waste from safe and joints.
Dribble pipe or weighted copper flap and soldering.
Wooden top.
Rounded or moulded edge. *Collect.*
*Deduct* perforation for bath.
Perforation in bath top.
*Add* rounded or moulded edge.
Enclosure to front and ends. *Collect.*
Extra for door.
Fastenings.
Skirting and mitres to top. *Collect.*
Joiner attend plumber to bath.

**WATER-CLOSETS—**

Apparatus.
D trap.
Soil pipe, including joints.
Bends.
Extra joints.
Connection with drain.
Perforations for pipes.
Ventilating pipe and joints.

Perforations in slating or tiling.
Set of flashings.
Hood and straps.
Lead safe.
Bossed angles.
Dribble pipe, if any.
Waste from safe and joints or copper flap.
Joiner attend plumber to safe.
Seat and riser and bearers and flap and frame.
Butts.
Hole, cut and dished for pan.
Ditto cut and beaded for handle.
Extra for seat and riser to remove easily.
Grounds.
Skirting and mitres and cut or mitred ends, or back and elbows. *Collect.*
Joiner attend plumber to w.c.
Paper boxes.
Candle brackets.
Pot cupboards.

### SUPPLY PIPES—

Cistern connector with union and fly nut and joint to supply.
Lead pipe to each w.c., apparatus, sink, &c. *Collect.*

In measuring supply pipes from cisterns, take the longest length first and then its branches.

Branch joints as they occur.
Perforations in brickwork as they occur.
Cocks as they occur.
Chase. *Collect.*
Pipe casing. *Collect.*
Plaster quirk. ,,
Waste preventers and their supply pipes.
Connection with main, paying fees, and making good roads and footways.
Lead pipe to supply the cisterns. *Collect.*
Trench for pipe. *Collect.*
Ball valve.
Perforations in brickwork for pipe.
Chase. *Collect.*
Pipe casing. *Collect.*
Plaster quirk. ,,
Stop-cock in each case, with the supply in which it occurs.
Chamber for stop-cock, if outside of building.
Water meter.
Brick chamber and cover.
Pump.
Lead suction pipe and joints, &c.
Rising main. *Collect.*
"Draw-offs" and their cocks. *Collect.*

### HOT WATER SUPPLY—

Hot water cistern and bearers.
Pipes. *Collect.*
Cocks.
Perforations in brickwork for pipes.
Chases. *Collect.*
Pipe casing. *Collect.*
Plaster quirk ,,

### DRAINS—

Cesspools, rain-water tanks, grease-traps, dumb wells.
Inspection pits.
Drain pipes, with their various depths of digging, bends, junctions, diminishing-pieces, siphon-traps. *Collect.*
Connection with sewer and pay fees.

### FINISHINGS—

Floor by floor, beginning with topmost floor.

**FLOORS—**

Flooring.
" for cuttings. *Collect.*
Flooring in small quantities and bearers. *Collect.*
Skirtings. "
Mitres. "
Irregular ditto. *Collect.*
Fitted ends. "
Housings. "
Cement skirtings. "
Mitres. "
Stopped ends. "
Returned mitred ends. *Collect.*
Dormers complete when there is no brickwork to them, with the windows of topmost floor.

**WINDOWS—**

May often be averaged.

Refer to the dimensions for the deductions of the openings. You will thus be sure to have the correct dimensions, and you will be less likely to forget any of them.

*Deduct* plastering and paper.
*Add* sashes and frames.
Moulded horns.
Iron tongue and white lead and groove in oak, and groove in stone. *Collect.*
Sash fastening.
Lifts.
Top fastenings, or eye and plate.
Linings. *Collect.*
Window-boards and bearers. *Collect.*
Notched, returned, and mitred ends. *Collect.*
Window-nosing. *Collect.*
Returned and mitred ends. *Collect.*
Window backs.
Canvassing and painting backs of ditto.
*Rendering* in cement behind ditto.
Long notchings of linings over ditto.
Beaded capping.
Grounds.
Architraves and their bases. *Collect.*
Plinth to window back.
Housings to ditto.
Glass.
Painting to frame and squares.
Shutters and boxings.

**DOORS—**

May often be averaged.

Refer to dimensions of deduction of brickwork.

*Deduct* plastering and paper.
*Add* door.
Fastenings.
Finger plates.
Linings. *Collect.*
Grounds. "
Dovetailed backings, if any.
Architraves and bases. *Collect.*

**CASEMENTS—**

May often be averaged.

*Deduct* plastering and paper.
*Add* frame.
Transome.
Casements.
Fastenings, water-bar.
Linings. *Collect.*
Grounds. "
Architraves and bases. *Collect.*
Glass.
Painting to frame and squares.

**FITTINGS—**

Not included with water supply, as cupboards, shelves, dressers, &c.

**PLASTERING AND PAPER**—Taken together.

First, all the apartments and next the passages.
Ceilings and whitening.

Cornices and bracketing. *Collect.*
Mitres. *Collect.*
Irregular ditto. *Collect.*
Enrichments. „
Returned and mitred ends. *Collect.*
Centre flowers. *Collect.*
Partitions. *Collect.*
Walls. *Collect.*
Ditto.
Cement angles.

There is seldom much advantage in collecting the plastering of walls of attics; the variety of heights is often so great that it is better to measure these one room at a time.

## STAIRCASES—

Treads and risers.
Winders.
Housings.
Moulded, returned, and mitred ends to steps.
Cut brackets.
Curtail ends.
Ends notched and fitted to newels.
Wall string, ramps, wreaths, mitres. *Collect.*
Outer string, ditto. *Collect.*
Landings and bearers.
Nosings.
Apron linings. *Collect.*
Newels, wood and iron.
Turnings to newels.
Balusters, wood and iron. *Collect.*
Iron stays.
Hand rail and core rail. *Collect.*
Scrolls to both. *Collect.*
Handrail brackets.
Ramp to both. *Collect.*
Wreaths „ „
Plastering to soffits and whitening. *Collect.*
Ditto ditto flueing. *Collect.*
Quirks.
Spandril framings.

## GASFITTER—

Pipes. *Collect.*
Syphon.
Meter.
Shelf or enclosure for meter.
Short length of pipe and connections.
Main cock.
Pay fees and make good footway.
Perforations in brickwork, as they occur in measuring pipes.
Attendance.

## BELLHANGER—

Bells.
Pulls.
Bell-boards.
Attendance.

## PAINTING—

# CHAPTER III.

## MODES OF MEASUREMENT.

ATTENDANCES.—Attendances are generally met by providing a sum, and the work involved is either charged day account or measured at completion; but inquiry will often give surveyor sufficient information to enable him to measure the work beforehand, and include it in quantities.

DISTRICT SURVEYOR'S FEES.—State the number of squares in area and the number of stories in height, counting the basement as one.

Observe where party-walls are raised or otherwise altered, that half the full fee will be chargeable for adjoining house. —See the Schedule of Fees, Metropolitan Building Act. When a building is of intricate plan, or the application of the Schedules of the Act is doubtful, the district surveyor may be consulted with advantage, or a sum provided.

Where any particular part of the work is of uncertain quantity, and it is nevertheless necessary that it be measured, it is usual and convenient to include such a quantity as the surveyor deems sufficient, which is kept separate in the bill and followed by the words "as provision," the real quantity used being adjusted at the settlement of accounts.

In cases where the drawings are to a very small scale, and no details are supplied, the surveyor should make a detail of any part which cannot be exactly measured from the small scale drawing, especially mouldings, the girth of which cannot otherwise be accurately obtained.

PROVISIONS.—Observe to take templates, painting, or any collateral work, as unloading, hoisting, or fixing.

When you decide to provide a sum for a particular portion of the work, as tiling, patent cement, paving, &c., the quantity should be measured and sent to the manufacturer for his estimate. The sum thus obtained can then be adopted, plus a certain sum for attendance.

## EXCAVATOR.

Dredging and Removing.—The quantity being usually uncertain, the contractor tenders at a price per ton; state that it includes barging and finding a deposit, or barging and depositing within a certain number of yards, and state the method of depositing.

Piling.—Measure the piles per foot cube; describe the timber as including fixing. Keep separate those below and above 144 square inches in section, and describe them in bill accordingly.

Driving Piles.—Each, state scantling, the length measured from point of shoe to finished top of head before driving, and the depth of driving measured from surface of ground to point of shoe.

If any parts of piles are cut off, measure the quantity per foot cube as a credit item, and state the average size of the pieces.

Number the cutting off of the heads, stating size of pile; if below water state it and describe the depth.

Waling Pieces at per foot cube, and describe as including fixing. Number the shoes and rings, stating size of pile and weight of each. State that they include fixing, and all nails, spikes, staples, &c.

*Bolts.*—Number and describe, as directed in Smith.

*Straps.*—Measure per foot run, afterwards reduce to weight, as described in Smith.

Coffer Dams.—Measure the piles and timber per foot cube as "use and waste in coffer dams, including all material," "carriage, fixing and removal." State if piles are 3 inches or 6 inches thick, as the case may be, and whether edges are shot.

Measure the ironwork as above, but describe as for "use and waste."

Measure the clay-puddle at per yard cube, and describe; state if mixed with chopped straw, and allow for ramming and removal.

Digging is measured as before excavation, and although earth always increases in bulk by removal, no allowance is made in quantity.

The nature of the soil should be stated if involving unusual trouble, as very stiff clay or rock, or if grubbing up old foundations.

If the building is on the site of an old one with a basement, the excavation should be measured from street level, as the rubbish from pulling down will have filled the cellars, or nearly so. The way the excavation has been measured should be stated, and a clause inserted "contractor to make his own allowance for any voids that may exist."

State if basketed (as is necessary in confined situations); if wheeled; if wheeled more than one run (20 yards); and how many runs, also if carted away, or deposited on the site.

Keep excavation beyond 6 feet in depth, beyond 12 feet, beyond 18 feet, &c., separate. State the depth and keep separate the various multiples of 6 feet, as 12 feet, 18 feet, &c., and to depths over 6 feet, say "including staging."

In measuring trenches where there is concrete, measure the trench the width of the latter, except in cases where the projection of the concrete is less than 6 inches on each side beyond the lowest course of footings, in that case, as in that of trenches without concrete, 6 inches on each side must be allowed.

If no strutting and planking is taken, further allowance must be made for slopes where the excavation is deep, but this is very rarely done, it is better to take strutting and planking. If done it should be stated in bill.

It is usual to commence measurement of excavation by removing the surface commonly about 12 inches deep.

Observe whether the ground is truly level; if not, and it is desired to bring it to a level, take off the soil to an *average* depth.

SURFACE DIGGING.—Where earth is removed over a surface it should be measured superficially, if not more than 12 inches deep, stating the depth; where more than 12 inches deep, measure by the cubic yard. State if it includes separation of vegetable soil.

The digging to basements should be taken as digging to basement . . . feet deep, throwing out, or basketing, or wheeling, and carting away, or spreading. If the basement is paved, take this excavation down to the bottom of the paving; or if there is concrete beneath it, to the bottom of the concrete.

The space between outer face of wall and outer edge of trench by the depth is to be next taken and deducted from the last, and added with the description, "excavation and returning, filling in and ramming."

DIGGING TO TRENCHES, *at per yard cube.*—State if to basement trenches, i. e. trenches below level of general basement excavation, or to surface trenches, i. e. trenches below level of general surface.

Describe as "excavation and carting away, or wheeling and spreading," or "digging to trenches, part filled in and rammed, and the remainder carted away." The former being the proper description for the part to receive concrete, the latter for the part of trench to receive brickwork.

In the measurement of trenches, collect the lengths of external *walls* and internal walls respectively, and be careful to put opposite each dimension a description of its position. These dimensions will be used for lengths of excavation, concrete, footings, and walls. This is the more usual practice, the difference between the lengths of excavation, concrete, and brickwork being, as a rule, but small. If it be desired to take the quantity with more exactness, a foundation plan must be made showing widths of trenches. For ordinary buildings, like dwelling-houses, the former course is recommended, but for a large building with thick walls a foundation plan should be used.

EXAMPLE OF ABSTRACT OF WALLS.

*External Walls.*

| | 1½ B. | 2 B. | 2½ B. |
|---|---|---|---|
| South of dining-room .. | 18 0 | 12 0 | |
| West of ditto .. .. .. | 14 6 | | |
| Bay (collected) .. .. | 23 6 | | |
| Remainder of west wall | 4 3 | | |
| North of west wall .. | | 15 9 | 4 6 |

If it should be necessary to separate the part carted away from the part returned filled in and rammed, it is quite easily arrived at. In the sketch (Fig. 4) the wall occupies three-eighths of the trench; three-eighths of the whole quantity measured would be carted away and the remainder filled in.

Fig. 4.

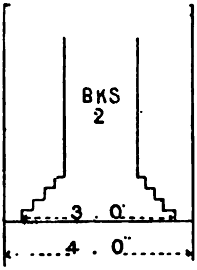
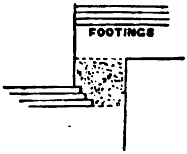


Fig. 5.



When foundations are stepped, it will generally be most convenient to collect the whole round of the walls for the minimum depth, and afterwards take the extra depths one at a time.

At the points where the steps occur, observe that concrete must be taken between the bottom of that of wall at upper level and the top of that at lower level, as sketch (Fig. 5).

Excavation in ground where buildings have previously existed should be described as "including any necessary grubbing up of old foundations."

If excavation is in small quantities to underpinning, state it and keep it separate.

Observe that where trenches are very close together, the earth between them cannot be left in; the surveyor must allow for removing it and filling in the space.

Digging for Drains is better included with the drains, but whether separated (rarely done) or not state the *average* depth of excavation and the size of pipe.

Observe that these depths must be taken at *regular* intervals, or it will be no average. Great errors have arisen from taking the depths without observing this rule.

Measure trench for water or gas pipes at per foot run, stating average depth.

For the computation of excavation in large quantities, as for railways, the prismoidal formula must be used, and the published earthwork tables will greatly facilitate the surveyor's work.

STRUTTING AND PLANKING TO SIDES OF EXCAVATION, *per foot run*, stating depth of excavation.—This should always be measured to basements, and if you are doubtful of its necessity, add the words "if necessary" to your description, but in any case measure it all.

STRUTTING AND PLANKING TO TRENCHES, *at per foot run*, stating width and depth of trench, or an item may appear in preamble to the bill of excavation, "all excavation to trenches to include strutting and planking, if necessary," in which case none need be measured, but it should always be measured when the trenches exceed 4 feet in depth.

CLAY PUDDLING, *at per cubic yard*, if more than 12 inches thick; if not exceeding 12 inches thick, per yard superficial; if filled in over arches or hoisted, state the height of hoisting.

CONCRETE, *at per yard cube*, where exceeding 12 inches thick; where not exceeding 12 inches, per yard superficial; if thrown from stages, state that it includes stages. State if in trenches, if levelled or to falls, and if measured per yard cube, measure the levelling separately at per yard superficial. If rammed state it in description. State if filled in over arches, in which case average the depth. If hoisted, state height of hoisting. Over trimmer arches, concrete is included, see p. 44.

EXPANSION BOARDS, *at per foot run*.—When the sizes of concrete arches render it necessary (over 9 feet span), an item as follows should appear: "allow for supplying, fixing, and removing expansion boards to edges of concrete arching." Also feet run, "allow for grouting-in after removal of expansion boards and pointing with mortar (or cement)."

HARD DRY RUBBISH.—*Measure as described for concrete.*

LEVELLING AND CONSOLIDATING GROUND, *at per yard superficial.*

*Number* post holes, giving *size of* post and depth of hole.

DIGGING TO CESSPOOLS is usually taken with the cesspool and included in the description; if not, measure as for basements, stating depth of excavation, see also page 46.

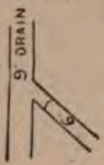
DRAINS, *at per foot run.*—State the kind, how jointed, if the joints are puddled around with clay, if opercular or half-socketed, or half-socketed at intervals, stating the distance (or measure as plain pipes and count the half-socketed pipes as extra on the plain), if Stanford's patent; also state the average depth of digging and include with the description.

Any length of pipe under 2 feet must be called 2 feet.

*Number* and describe as "extra for" bends, junctions, double junctions, diminishing pieces, siphon traps.

And observe that junctions and diminishing pieces are designated by the size of the main pipe of which they form a part. Thus the junction shown in sketch (Fig. 6) is a 9-inch junction.

FIG. 6.



Number gully traps, stating size and number in trade list of manufacturer. Include in description bedding in concrete and connecting with drain.

Number the connection with sewer and fees.

If the architect has not shown the drains on his plan, the surveyor should, on a tracing of the ground plan, draw the drains, marking upon it all the rain-water pipes and waste pipes, and should supply a copy to the architect.

## BRICKLAYER.

In a large building it will be found of advantage to the surveyor in the collection of internal walls to divide his work into sections. He will usually find several walls which pretty clearly perform this function. He will first take these walls and then those in each section thus formed. See also "Examples of Taking off."

Compare the plan of each floor with that of the floor above, to see if any brickwork is shown on the upper floor for which there is no support below, as in such case provision must be made for it either by thickening walls or introducing girders, &c.

Count the fireplaces, see that the proper number of flues are shown on each floor, and that the chimney breasts or backs are of sufficient projection to contain them.

Observe whether shafts are drawn large enough to accommodate the requisite flues.

Where there are extra thicknesses of walls, to receive plates of ground joists or to form plinths, it is better, as these usually only occur at parts of the walls, to collect them afterwards, measuring the wall at first (in the collection) of the thickness required minus the thickness of that part required for plinths or sleepers.

Where arches occur over passages, measure the work as though the wall was continuous, deducting the voids in the usual order.

State in all cases whether brickwork is in mortar or cement.

It is the usual practice where only a small part of the work is built in cement to measure the whole of the brickwork as though it were in mortar, and to again measure the parts in cement, calling it "Brickwork extra only in cement."

Brickwork is measured superficially, stating opposite the dimensions the number of bricks in thickness, or measured cubically where in very thick or irregularly s aped walls. The whole is reduced to the superficial rod=5½ yards by 5½ yards, or 272 feet 3 inches, but always taken 272 feet 1½ brick thick, except 4½ inches and 9 inches, as p. 41.

Brickwork in large or irregular shaped masses is often most conveniently measured in cubic feet, and is so abstracted.

If brickwork is over 60 feet from the ground, it should be kept separate, and all above that level divided into heights of 20 feet described as "60 feet to 80 feet," "80 feet to 100 feet," &c.

Brickwork in small quantities in filling in of opening of old works or in similar positions should be kept separate and described as "in small quantities inserted."

Keep brickwork in backing to stonework separate, and state that it includes the *necessary* cutting.

Keep work in raising an old wall separate; if any work is built "overhand" it should be stated.

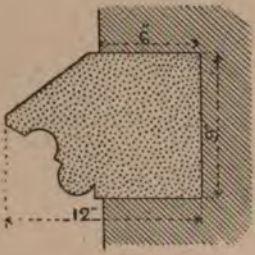
Keep work to old walls distinct from that to new work.

If brickwork is in small quantities to underpinning, state it, and whether in cement, and keep it separate. Also state if it includes iron wedges or pinning up with slates, or if any timber will be left in.

It should be observed that the bricks used in some of the northern and midland counties will frequently rise as much as 13 inches and upwards to the four courses instead of the London average of 12 inches; this will affect both the brickwork and the stonework bonded with it.

If gault bricks are used, the walls will finish of a greater thickness than they would if built with ordinary bricks; a three-brick wall would be about 2 feet 4 inches thick. The work may be measured as of the ordinary thickness and a percentage added to the abstract before billing.

Fig. 7.



Measure walls to the top of the wall plate where the latter is not more that 3 inches thick; where over 3 inches allow that height for labour of bedding.

Stonework is not deducted unless over 6 inches in height. In cases where it is deducted it is better to do so after taking the dimensions of the stone, usually the same dimensions serve for both. Often the stone exceeds the deduction of brickwork, and in some instances it will save labour to fix some proportion for the deduction, as ½, ⅓, &c., otherwise a new dimension must be taken for the deduction. The following instance shows the above-mentioned process:—

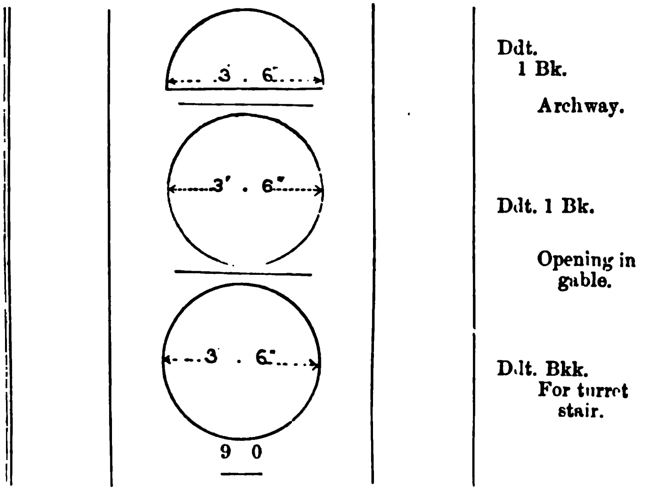
| | | | |
|---|---|---|---|
| | 100 0<br>1 0<br>9 | 75 0 | C. Box Ground stone and<br>Ddt. ½ Bkk.<br>String below first floor window sills. |

Where the stonework of a building consists principally of quoins it is not generally deducted, but the course adopted should be clearly stated in the bill.

No deductions are made for flues under 2 feet square in diameter, but a flue of such size would certainly be for a furnace chimney. In such cases measure the shaft and deduct the void; keep the brickwork separate and state that it has been measured net, and what it is. Flues at an angle with the horizon of less than 45° must have soot doors provided.

Where semicircular or circular superficial or cubical dimensions occur, they are treated as in the following examples :—

Fig. 8.



To fireplaces deduct the chimney opening only. The theory is to deduct ash-holes of coppers, but it is rarely done, and in the writer's opinion should not be. See "setting coppers" in works numbered. The majority of deductions will depend upon the size of the joinery to be fixed in the openings. The *general* rule to be observed as to deductions of brickwork for internal doorways is to allow 3 inches in width and

3 inches in height beyond the finished size of door; for external door-openings and window-openings to receive solid frames, the clear dimensions between reveals and between sill and head for the external part, the same width plus 4 inches, and the same height plus 3 inches for the internal part. The deduction for window openings intended to receive sashes and frames will be for the external part as last described, the same width plus 9 inches and the same height plus 3 inches for the internal part. Deductions for openings with segmental heads should have their height measured up to the springing of the arch only, if the rise does not exceed 1 inch to a foot of span; if it does exceed, the mean height must be taken.

In the measurement of brickwork the surveyor should turn to the collection of the lengths of the walls of basement, if there is one, and measure first the external walls up to a convenient level, such as ground-floor level, then the internal walls up to the same level.

He should then measure the walls where there is no basement, bringing them up to the same level as last.

Proceed with the measurement of each floor in the same manner until you have arrived at the top.

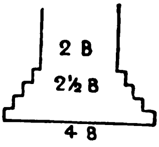
Finish measuring the whole of the brickwork up to a certain level before you begin to measure anything above that level.

Footings are averaged thus: By adding the top and bottom courses together and dividing by 2, the dimensions as below:—

| | | | |
|---|---|---|---|
| 100 0<br>1 0 | 100 0 | 3¼ B. | Footings to Bk. walls. |

2½ B.
4
—
2) 6½B.
—
3¼ B.

FIG. 9.



Observe that within the jurisdiction of the Metropolitan Building Act you must take as many courses of footings as are prescribed by the first schedule of the Act; your drawings will sometimes show fewer.

The number of courses prescribed equals in number the half bricks in thickness of base of wall, and the average width of footings is as follows:—

| | |
|---|---|
| ½ brick wall average .. .. .. .. .. | 1 brick |
| 1 " " " .. .. .. .. .. | 1¾ " |
| 1½ " " " .. .. .. .. .. | 2½ " |
| 2 " " " .. .. .. .. .. | 3¼ " |
| 2½ " " " .. .. .. .. .. | 4 " |
| 3 " " " .. .. .. .. .. | 4¾ " |

Brick walls 9 inches in thickness and not plastered are kept separate and described as "reduced brickwork in one-brick walls, fair both sides." Do not insert the word "struck" as is sometimes done. If fair one side only reduce as ordinary brickwork.

Half-brick partitions and half-brick sleeper walls are kept separate and not reduced; if built "honeycomb" or "pigeon hole" state it.

Brickwork circular on plan, where over 25 feet radius, should be measured as common brickwork first, and then one face measured and described as "extra labour to circular face on brickwork, one face only measured." Where under 25 feet radius keep the brickwork separate, state the radius, that it is in wall circular on plan, and that it includes any necessary cutting and take a template, stating length.

When walls are built battering, keep them separate and state how many inches they batter for each foot in height. When one face only batters measure a superficial item of extra for battering face, giving the same particulars; the brickwork may go into bill with the general brickwork. Observe to take the rough cutting where it changes from battering to perpendicular or the opposite.

Measure hollow walls solid as reduced brickwork, state the thickness, make no deduction for cavity, but state its width, the kind of ties used, the number to each superficial yard, and whether haybands are placed along hollow to keep out falling rubbish.

Measure vaulting at per rod reduced. Take the mean girth by the length. State the thickness and whether in mortar or cement. Observe whether it runs beyond the end walls, enclosing the area to be covered.

Measure groin point at per foot run; describe as labour and waste to groin point of vaulting, stating thickness of vault.

BRICK SEWERS.—Measure the quantity of brickwork at per rod. State the diameter of the sewer, its shape, the kind of bricks, whether purpose-made arch bricks are to be used, the number of rings in thickness, and that it includes all cuttings.

## WORK MEASURED BY THE SUPERFICIAL YARD.

LIMEWHITING usually taken with joints of brickwork, struck fair. Raking out and pointing to soffits taken with limewhiting, when limewhited. Observe that raking out, &c., is impossible if the vaulting is in cement. Describe as cleaning off, and making good.

BRICK-NOGGING.—State the timbers (taken with partitions) are not deducted, and are "elsewhere taken" whether in mortar or cement, whether bricks flat or on edge, and if including nogging pieces. See p. 67.

CEMENT FLOATED FACE to receive tile pavings. State thickness.

CEMENT PAVING.—State thickness if finished in pure cement, if to falls. The patent cement pavings, like Wilkinson's, are usually included as a provisional sum.

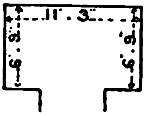
TAR PAVING.—State thickness and if covered with siftings of Derbyshire spar, or obtain an estimate and include the amount in the estimate as a provision.

BRICK PAVING.—Describe quality of bricks, if flat or on dge, if bedded in mortar or sand, if jointed or grouted with nt.

ure cuttings at per foot run where the sides of the area re not at right angles.

**Wall Tiling.**—Measure the exact area covered and measure at per foot run cutting and waste wherever the dimension is not a multiple of 6 inches (if 6-inch tiles, if not, of the size of the tile), or when the sides of area covered are not at right angles, and say measured net in the example here shown, assuming the tiling to be 3 feet in height, the process will be as follows:—

Fig. 10.



PLAN

| | | | |
|---|---|---|---|
| 24 9<br>3 0 | 74 3 | 6-inch white glazed tiles fixed to walls in Portland cement and jointed with fine putty, *measured net*. and<br>Rendering ¾ inch thick in Portland cement to receive wall tiling. | 6 9<br>11 3<br>6 9<br>24 9 |
| 4/ 3 0 | 12 0 | Cutting and waste to wall tiling (one cutting to each vertical angle). | |

Another way is as follows, in which the dimensions are multiples of 6 inches.

| | | | |
|---|---|---|---|
| 25 6<br>3 0 | 76 6 | 6-inch white glazed tiles fixed to walls in Portland cement and jointed with fine putty, including cuttings. | 7 0<br>11 6<br>7 0<br>25 6 |

**Tile Paving.**—State quality, usually described as P. C. so much per yard superficial, exclusive of laying, and how laid. If the tiles are 6 inches, the length and width of dimension taken must be multiples of 6 inches, say, including cuttings or measure the exact area. State it as measured net, and measure cuttings at per foot run; state whether straight or raking.

**Asphalte Paving.**—State thickness, kind, if to falls, if vertical, if on arches, if laid by any particular company's own men.

Take forming channel at per foot run extra upon the area measured, number making good to bases, gullies, &c.

Take skirting at per foot run, state thickness, height, if square or chamfered, and number the mitres, stopped ends, &c.

## WORK MEASURED AT PER FOOT SUPERFICIAL.

Rough Cutting.—Measure it all to rakes, skewbacks, and other positions where the brickwork requires cutting. If cuttings are fair they are taken with the facings. If under 6 inches wide measure per foot run. (See Facings, p. 49.)

Rough Relieving Arches.—Some surveyors simply take the rough cutting, others measure the quantity in them and describe them as "reduced brickwork, extra only in rough relieving arches." The best way is to number them, describing their length, width of soffit, and depth (about 6 inches longer than the lintel is about the average length), and describing them, as, "extra labour, cutting and waste to relieving arches, 5 feet by 1 brick by 1 brick," or, as the case may be, averaged in abstract. (See p. 132.)

Rough Segmental Arches are measured in the same manner as last.

Trimmer Arches.—Measure the length between the floor trimmers by the width of the hearth plus 3 inches; state whether in mortar or cement, and if levelled up with concrete, and include the concrete with the item.

Damp Proof Course.—Refer to the collection of walls for the length, and multiply by the width; state if asphalte, asphalted felt, tar and sand, or slates; if latter, say if it is in cement, whether one or two courses, and that it is measured net, including cuttings.

## WORK MEASURED AT PER FOOT RUN.

Rough cut Birdsmouth, &c. (Fig. 11), or Squint Quoin (Fig. 12).—In both cases many surveyors simply call it rough chamfer; in the latter case correctly, in the former incorrectly, if it is properly done, but in the majority of cases rough chamfer is all that is done for birdsmouth.

The words "rough chamfer: on brick," should be used when only one brick is cut; where more than one, it should be called "rough splay on brick," and the width thereof stated.

Filleting to Slating or Tiling.—State whether in mortar or cement, and if twine or nails or both are used.

Fig. 11.

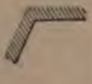
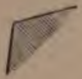


Fig. 12.



Raking out and Pointing Flashings with Cement.—Take the same length as the lead flashings. Keep that to stepped flashings separate. Cutting and Pinning Landings in Cement. Cutting and Pinning Edges of Shelves (if this is done after the plastering you must also take an item of plastering made good to shelf edge).

Cutting or Forming Chase for Pipe.—If in old work state it. Extra Labour and Materials, Cutting and Bonding New Wall (stating Thickness) to Old; in this case measure new work up to face of old wall only. "Chase, Cut, and Parget," in which case measure sufficient brickwork to allow for the bonding. "Labour rough oversail or set back one course."

Cores to Columns.—Describe as "Brick in cement core to diminished shafts to columns, 14 inches mean diameter, including cutting." If diminished or swelled state it.

Level and Prepare Old Wall to Receive New Work.—State thickness of wall.

## WORK MEASURED AT PER YARD RUN.

Iron Hooping.—Give size, length may be obtained from collections of walls, and add 5 per cent. to length to allow for laps. State if tarred and sanded, if Tyerman's patent, and that it includes laying in walls. Make no deduction for the parts cut out, and measure right through openings. Measure one line of hooping to each half brick in thickness of wall at the levels specified.

## WORKS NUMBERED.

Frames, Bed and Point.—State if screeded in. Keep window frames separate if the sills are bedded in white-lead. Call frames over 24 feet superficial large; over 36 feet, extra large. In the case of loophole frames measure at per foot run.

Setting Stoves or Ranges.—State kind of stove. Give size of openings, and state that it included the necessary firebricks. If slow combustion stoves, such as Barnard and Bishop's, state that they include fire-lumps also, and if any extra firebricks. Average the widths of similar stoves.

Setting Air-bricks or Gratings and Forming and Rendering Openings.—State thickness of wall and size of grating, and if grating is more than 9 inches long, that it is to include the necessary cover stones, and whether the opening is cranked.

Parget and Core Flues.—When of a common length the dimensions need not be mentioned, but if very long—over 50 feet—their length should be averaged and stated.

Parget and Core Ventilating Flues.—Average their length and state size.

Cut and Pin Ends of Steps, Thresholds, &c.—State whether to new or old walls or to facings.

Note.—"Cut and pin" should be taken to any ends of timber or stone which go into a wall, as in the majority of cases, whether made good to, or *cut away for*, the labour is about equal.

Ends of stone treads and risers may be described together as ends of steps cut and pinned.

Chimney Pots and Fixing.—State height and material, or provide a sum for each. State that they are bedded and flaunched with cement.—Window Sills.—Where very large sills, as in Gothic work, take "sills bedded hollow, made up and pointed at completion," counting each light of the window as one sill.

Cesspools, Grease Traps.—Describe length, breadth, and depth in clear, thickness of brickwork, if in cement, if rendered in cement, cover, grating, if any, how many ends of pipes made good thereto, and connection or connections, stating how many, with drain, and state that they include digging.

Rain-water Tanks are best taken out in detail, and billed as a separate section after the drains.

PERFORATIONS IN WALLS FOR PIPES AND MAKING GOOD.—State thickness of wall. Thickness averaged in abstract.

EYELETS, stating thickness of wall and what they are for, as "for 6-inch drain pipe through 1½-brick wall (averaged)."

WELLS.—Describe in one item, state diameter and depth in clear, if steined dry or in mortar or cement, or part in either, and that it includes digging. The curb may be included in the description. Sometimes in addition to this the quantities are given in detail "written short." (See section "Billing," p. 138.)

Treat large cesspools in the same manner.

SETTING COPPERS AND THEIR IRONWORK, including brickwork and rendering externally with cement, state size of copper, that the setting includes the necessary firebricks and connection with flue.

## FACINGS.

FACINGS *at per foot superficial*, measure the net quantity as extra on common brickwork, and the pointing measured with it; state the kind of bricks, the bond, the kind of pointing, deduct all openings and gauged arches, allow 3 inches below surface of ground. If gauged arches are measured extra on facings they must not be deducted.

Be sure of the architect's intention as to pointing, whether "Joints struck fair as the work proceeds" or "Rake out and point" is meant.

If facing is filled in between relieving arches and window heads after the general facing is done, it should be kept separate and its position described.

Measure the whole depth of the reveals as facing; some surveyors allow only half the reveals, but the majority allow the whole. When the reveals are cemented the facing should not be measured. Where there are dressings, cornices, &c.,

of better bricks, measure first the whole surface of the walls, including the dressings, &c. Work which has been built in cement must have its face measured in addition, and described as "Raking out cement joints, and pointing to match facing."

EXTRA ON FACINGS FOR GAUGED ARCHES *at per foot superficial.*—Measure the whole surface of face and soffit; for the face the mean length midway between the soffit and top of arch. Describe the bricks and the pointing and whether straight, cambered, or Gothic, if set in cement or putty, and how pointed.

When the bricks for dressings are of better bricks than the general facings, measure the former and deduct the latter. For quoins, average the width of the two faces, and multiply by the height. A running length of "extra for bonding quoin with common facings" should also be taken, or a general clause may be put in the bill stating that the better facings are to include bonding with the commoner ones.

BRICKWORK IN RUBBERS CLOSELY SET IN SHELLAC FOR CARVING, measure per foot superficial as extra on common brickwork.

BATTERING FACE *at per foot superficial*, state amount of batter.

DIAPERS.—Measure these at per foot run if not exceeding 12 inches in width, per foot superficial if over 12 inches; describe as "Extra on facing;" say how bricks are arranged, if any of them project and how much, &c.

STRING COURSES.—Measure the length by the height by the average projection as plain brickwork, the length by the girth as facing. Deduct the facing behind it, the whole face of the wall having been measured before.

MOULDED COURSES are measured as "extra on facings for one course (or two courses as the case may be) of moulded bricks." Number the mitres, &c., state if in cement (or take the cement work as extra only), if on edge, if all headers. Measure the length by the height by the average projection as plain brickwork, the length by the girth as facing. Where courses of the facing are simply oversailing or set back, measure by the foot run, and describe as "oversail or set back one course of facings."

Brick on Edge Coping, *at per foot run.*—Measure as "extra on brickwork for brick on edge, and double plain tile creasing in cement," and state the thickness of wall, and if cement fillet on each side (this will have been measured before as common brickwork). Measure the labour to moulded or dentil cornice at per foot run, giving a sketch, and describe as "extra labour on facings."

*Brick sills per foot run*, state how many courses, if on edge, in cement, all headers, and describe as including fitted ends.

It is the practice of some surveyors to measure all the better facings as "extra on common facings," but this leads to confusion.

Also, to measure string courses of better bricks as "extra on common facings, for extra labour and *materials* to string course, of two courses moulded bricks and one course oversailing, in red bricks, in cement, 9 inches high, 6 inches projection," or as the case may be.

The way first mentioned is the better one, it produces a more condensed bill.

*Measure at per foot superficial.* Fair cut and rubbed splay and moulding, over 12-inch girth, not exceeding 12 inches at per foot run.

*Measure at per foot run,* "5-inch circular and skewback cutting," "fair cut and rubbed squint quoin," "fair cut and rubbed birdsmouth," "mouldings under 12 inches girth," and how much, and let the description include cuttings generally; a sketch should be given. Extra labour plumbing angles of battering facing, stating the amount of batter in each foot of rise.

Terra-cotta *per foot cube.*—Each piece is measured as a cube of the size which will contain it. Only two kinds of terra-cotta are recognized in the trade, one kind *plain* or *moulded*, the other *enriched;* keep the two kinds separate. State the colour, the general thickness of the terra-cotta, if chambered, the composition of filling in, if of Portland or Roman cement, or cement concrete, and whether filled in before or after fixing, the kind and colour of the mortar in which it is to be set. Make *no* deduction of the brickwork, but state this fact in the bill, and although the greater proportion of the terra-cotta will be chambered, it is measured as if solid. State if pieces of hoop iron are used for the bonding of blocks together, and if galvanized, or whether the blocks are joggled together, and if it includes modelling.

Take care to arrange for plenty of vertical joints. If the plan of a jamb can be divided into several pieces the adjusting of the lines of moulding will be so much the easier.

Where in considerable quantity, an estimate is sometimes obtained from a modeller for the modelling, and the amount for modelling included in the estimate as a provision; or the models for enriched work only, may be thus treated (the estimate being obtained from a stone carver), the general contractor preparing and supplying the remainder.

A model must be taken for every piece of terra-cotta, except where exact repetitions of shape; but observe that in some cases the same model will be usable for two pieces apparently different, as for right and left jambs of an opening when moulded on one face only.

If a separate contract is entered into with the terra-cotta manufacturer, it will be stipulated that certain proportions of the material shall be delivered by given dates, as "all the terra-cotta below first floor," that between first and second floor level, &c., and it will be necessary to keep these sections distinct in dimensions, abstracts, and bills.

*Per foot run*, "clean off reveal of terra-cotta door and window jambs to receive wooden frames."

"Clean up and straighten groove for lead lights."

*Number* notchings, ends cut and pinned, copper cramps or dowels and mortises, &c.

CONCRETE BUILDINGS.—Measure the concrete per yard cube, state how it is mixed, and the proportions of the materials and that it is in walling; keep the 9-inch and the 4½-inch walls separate, and measure them at per superficial foot. Number the openings as "extra labour to forming openings average . . . feet superficial each, with square (or segmental, as the case may be) heads in walls . . . inches thick, including moulds and centering."

*State that the price* shall include all necessary apparatus.

## MASON.

The usual London practice of measuring stonework, and by far the best method, is to take out all the labours upon it; this is the only way of arriving at the exact value of the work in question. The labour of the surveyor is, however, frequently not appreciated as it should be, the builder simply reading through the labours or looking at the drawings, and afterwards pricing the items of cube stone at a price which, in his opinion, will pay for stone and labour, and leaving the labour items unpriced.

Another method is to take out the stone, including labour, and to divide it into a few main items, each composed of stone upon which the labour is similar, and giving sketches to the more ornate parts, as "stone and labour in chamfered jambs"; "ditto in moulded ditto"; "ditto in chamfered plinths and strings, &c."; "ditto in sedilia, as sketch, &c."

To measure stone properly, the surveyor should know all the processes through which the stone must pass.

State in all cases how finished, whether rubbed or dragged, if any stones are in scantling lengths (over 6 feet long for most stones except Mansfield), if hoisted over 40 feet, after which divide into heights of 20 feet, describing as 40 feet to 60 feet, 60 feet to 80 feet, &c., if bedded in mortar or cement, or the stone may all be put together and the extra hoisting charged, as "100 feet 0 inches cube. Extra hoisting to stone between 40 and 60 feet of height."

This division of heights is sometimes modified when a well defined line of the building occurs within a few feet, but describe the real state of the case.

State if any of the labour or materials is in small pieces, although the aggregate quantity may be large.

The adherence to the order of length, breadth, depth, in taking dimensions is more important in this trade than in any other, for the sake of after identification of dimensions.

Measure all stone not exceeding 3 inches thick per foot superficial.

In cases where plastering stops against quoins, jambs, &c.,

as in the interior of some churches, the surveyor must observe to measure the stone sufficiently large to leave it flush with surface of plaster.

In some parts of the country the facing bricks are so large that four courses will rise 13 inches and upwards instead of 12 inches. Quoins and jamb stones will be affected accordingly.

In taking off intricate stonework, the surveyor will sometimes find the labour of description of position saved by numbering the stones in pencil, but if he adopts these numbers he should make a tracing showing the stones with the numbers to deposit with his dimensions.

In taking off a long length of string or plinth, &c., where there are exceptional pieces of stone, as splayed angles or stones of extra size, take all these before taking the main length, the bed of which latter may be averaged.

All labours (except preparatory faces) are measured over the finished surface shown, except beds and joints, in which one face measured represents two faces.

To save dimensions the bed and joint are not unfrequently taken together: see examples.

When a number of stones are measured in one dimension state how many there are.

In all cases of " stone and labour " state what faces of the stone are rubbed, tooled, &c.

For the stone, take the size of a square stone of the smallest size required to contain the finished block *at per foot cube* as it goes to the banker, but in all cases where there is a fraction of an inch call it an inch.

State that it includes hoisting and setting.

*Beds and Joints.*—Take a bed and a joint to each stone and describe as plain beds and joints, one face measured for two *per foot superficial* (this gives you labour on four faces to your stone), the theory being to take four preparatory faces on each stone.

For small mullions up to 10 inches by 5 inches, two beds are usually allowed for each stone, over that size the general *rule applies.*

The labour to back of stones is generally best described as back, and say if "sawn or drafted" *per foot superficial.*

In long lengths of stonework, where the joints are not indicated on the drawings, allow one to each 3 feet in length.

SUNK BEDS AND JOINTS *per foot superficial, and described as "all measured,"* are taken to all beds and joints which are sunk below the general surface, or when the stone is not rectangular.

PLAIN FACE *per foot superficial, and described as "all measured,"* is taken to all exposed plain surfaces, such as those of a true cube. When the face involved is identical with either of the four faces already dealt with, deduct half bed or half joint, i. e. wherever plain face is taken no bed or joint should be allowed for that surface. (See description of Beds and Joints.)

SUNK FACE *per foot superficial, and described as "all measured,"* is taken to all surfaces below the general surface, or to those surfaces where the stone is not rectangular, as in weatherings, rebates, &c. Where the sinkings are narrow (under 6 inches) measure per foot run, stating the width; where the sinking cannot be worked straight through the stone, it is called sunk face stopped, and must be kept separate.

ROUGH SUNK FACE *per foot superficial, and described as "all measured,"* is taken in addition to the sunk face, to the general face of all mouldings or sunk faces, which are 3 inches or more below the general surface of the stone.

CIRCULAR FACE *per foot superficial, and described as "all measured,"* where the surfaces are convex as to columns.

CIRCULAR FACE SUNK *per foot superficial, and described as "all measured,"* where the surfaces are concave, as to soffits of arched stones, where stopped state it, and keep it separate.

CIRCULAR CIRCULAR FACE *per foot superficial, and described as "all measured,"* where the surfaces are convex, as to surfaces of spheres or domes, where stopped state it, and keep separate.

CIRCULAR CIRCULAR FACE SUNK *per foot superficial, and described as "all measured,"* where the surfaces are concave to internal surfaces of domes or niches, where stopped state it, and keep separate.

MOULDED WORK *per foot superficial, and described as "all measured."*—Labour to cornices, strings, &c., where more than 6 inches girth, where not exceeding 6 inches girth at per foot run, where stopped or circular state it, and keep separate. Undercut mouldings which are mitred will always be described as stopped.

In measuring the superficial quantity of moulding on cornices or strings where mitred, take the extreme length you can find, as at external mitres moulding is done and afterwards destroyed in working the mitre.

*Number* the mitres, stopped ends, splayed ends, returned and mitred ends, &c.; these are averaged in the abstract. Sometimes measured at per foot run and afterwards averaged.

MOULDED WORK, CIRCULAR, CONTINUOUS, *measured as last*, as to caps and bases of columns.

HALF-SAWING AND PREPARATORY FACES.—Half-sawing is taken by some surveyors to all the faces of the stone; this would be to back, and as a preparatory face for sunk work, moulded work, and circular work. In the foregoing definitions bed and joint takes its place, and is more in accordance with the usual practice.

Both faces of stone for tracery to be first measured as plain work.

For mullions take plain work on all four faces of the stone as it comes from the saw.

## WORK MEASURED AT PER FOOT RUN.

THROAT.—State if it includes stops, if not, number the stops.

REBATE or moulding under 6 inches girth. State if it includes stops. BACK JOINT. MITRE TO SPLAY. CHAMFER up to 3 inches wide, DOUBLE ARRIS JOGGLE PEBBLES AND CEMENT. GROOVE FOR LEAD LIGHTS AND POINTING ON BOTH SIDES IN CEMENT. GROOVE FOR FLASHING AND BURNING IN. JOGGLE JOINTS TO LANDING.—State thickness of landing and kind of joggle.

### ITEMS NUMBERED.

Perforations.—State diameter and thickness of stone. Mitres to Mouldings.—State girth. Stopped Ends to Mouldings.—State girth. Stopped Ends on Splay to Mouldings.—State girth. Splayed or Moulded Stops to Chamfer.—State width of chamfer. Mitres to Chamfer.—State width of chamfer. Mortises and Sulphur or Lead and Running, stating what for. Large Ditto. Iron Dowels and Mortises.—State in what stone. Slate Dowels, Mortises, and Cement. Copper Cramps.—State weight and size, and mortises and lead and running. Galvanized Iron Cramps.—State weight and as last. Holes for Pipes.—State thickness of stone. Mortises for Door Frames. Perforations for Coal Plates or Gratings.—State diameter and in what stone. State if rebated. Lead Plugs and Mortises.—State what stone.

Small Metal Articles connected with Masonry.

Templates.—State size, if rough, self-faced, tooled, or tooled where exposed. Corbels.—Give description and size. Sink Stones.—State size and thickness, and how many holes, if dished, if tooled or rubbed, if with iron grating include it with the description, and state if it is run with lead or cement. Sinks.—State size and thickness, how many rounded corners, if perforated for bell trap, on how many sides cut and pinned to wall, whether on and including brick or stone piers, or measure at per foot superficial, and state rounded corner, perforation, and cutting and pinning separate, state if tooled or rubbed.

Chimneypieces.—For these provide a sum, to include fixing, or take the fixing separately and state that it is to include the necessary cramps, or they may be measured in detail.

### WORK USUALLY MEASURED AND DESCRIBED AS STONE AND LABOUR.

Ashlar *per foot superficial.*—State the average thickness on bed, the number of bond stones per yard superficial, and how finished both face and back. Describe as including all beds and joints, or ashlar may be taken at per foot cube and the labours per foot superficial.

Steps, window sills, thresholds, per foot run.

State size, and in case of steps it will probably be better to give a sketch. Where landings are thinner than the height of step, observe to take risers to landings.

Bosting.—To enriched mouldings not exceeding 6 inches girth at per foot run; when exceeding 6 inches girth at per foot superficial.

*Number* bases, terminals, finials, caps, &c., giving the three dimensions.

Carving.—The value of this depends so much upon the skill of the workmen employed that the usual method is to provide a sum for it, an estimate being first obtained from a carver selected by the architect.

If it should be necessary to measure it, measure it as described for bosting and refer to sketches in margin, but take care that it is carving and not mere mason's work.

## YORKSHIRE STONE.

State how finished, self-faced, tooled, quarry worked, or rubbed.

Pavings *per foot superficial.*—State thickness, if in parallel courses, if the stones are to be not less than a certain number of superficial feet each, if bedded in mortar, if bedded and jointed in cement, measure irregular shaped stones as square stones of the smallest size out of which it is possible to obtain them. It is sometimes convenient where stones are of triangular shape and many of them, to number them, and state the extreme dimensions, or measure net and describe as in "triangular shapes measured net."

*Measure at per foot run* tooled edges, coped edges, rubbed edges, sunk edges, splayed edges, notching, splayed cutting and waste, circular cutting and waste; in all cases state the thickness of the stone.

Landings *at per foot superficial.*—When not over 30 feet superficial, when over 6 feet in length, state the exact size as

7 feet by 4 feet, state thickness and how finished. Any stone of 15 feet superficial or over should be called landing, also any stone of whatever area if more than 3 inches thick. Measure portion tailed into wall and allow in the measurement of each joggle joint.

*At per foot run*, joggle joints on solid, tooled edge, rubbed edge, moulded edge, splayed edge, circular edge, sunk edge, in all cases state the thickness of the stone.

TREADS AND RISERS *per foot superficial.*—State thickness, describe whether rubbed or otherwise, take the tooled edges separately, or include them in the description, keep winders separate, measure them net, and describe them as such.

HEARTHS *per foot superficial.* — State thickness, describe whether tooled or rubbed and as including jointed edges. Number the notchings to chimneypieces, state whether single or double. Should never be measured less than 12 inches longer than width of opening and 18 inches wide. If hearth and back hearth in one, measure the notching per foot run.

SHELVES *per foot superficial.*—State thickness, take tooled edges per foot run, or include them in description.

COVER STONES *per foot superficial.*—State thickness, state if bedded and jointed in mortar or cement. either measure tooled edges per foot run or include in description.

CHIMNEYPIECES, JAMBS, MANTELS AND SHELVES *per foot superficial.*—State thickness and whether moulded, chamfered or stop-chamfered.

### WORK MEASURED AT PER FOOT RUN.

In dealing with a long length of either of the following items if the description does not include joints take two "jointed ends" where each joint occurs, stating sectional size of stone.

CURBS.—State size, if joints joggled with cement, or plugged with lead, and whether joints are included, if rounded, rebated, chamfered, or throated. Take fair throated ends where they occur.

COPINGS.—State size, if weathered, twice weathered, throated, *twice throated*, circular on plan or elevation, if circular, state that the size given is finished size, state how jointed, and if bedded in cement, and if including joints.

*Number* the angles or knees, and state if out of solid and the size of stone out of which they are obtained, sunk joints, fair ends.

STEPS.—State extreme size, whether solid or spandril, on what faces worked, if sunk rebated, if back jointed, if rubbed all round. State if moulded, and if spandril, whether with square wall hold. Spandril steps should generally be illustrated by a sketch in bill.

*Number* the winders, giving extreme size, and state if soffits are flueing.

*Number* steps with curtail ends, stating size and describing the labour upon them.

Sometimes the plan of staircase and the sections of the steps will make it necessary to measure the steps as directed for general masonry, i. e. cube stone, beds and joints, moulding, &c.

WINDOW SILLS of the usual section.—State size, if sunk, weathered, throated, if grooved for iron tongue (to every joint take two jointed ends).

*Number* fair ends.

THRESHOLDS.—State size, and that they include jointed edges.

## GRANITE.

In London and its vicinity, granite when in considerable quantity is usually separately tendered for, and would in such case form a separate bill.

It is measured as described for other stones, except that the beds and joints are all measured instead of "one for two." Describe whether "axed," "finely axed," "nidged," or "sparrow picked" on face.

In cases such as corbels or bases, number the stone and describe all the labours on it in one item, and bill it as "stone and labour."

Take polishing by the foot superficial.

## RUBBLE WALLING.

The rubble most commonly used in London is of Kentish rag, this is measured by the cubic yard; as it is more generally used as a facing with a thick brick backing, the walls should be measured, first their whole thickness as of brick, and afterwards the stone measured superficially of an average thickness and described as "extra on brickwork for, &c."

In the case of rubble walls where stone of the same kind as that used for the rubble is used for the facings and dressings, the best plan is to measure the whole of the walling at per yard cube. The facing per foot superficial as extra on rubble, giving a description of the coursing, pointing, &c. The dressings as extra on facings, stating what they are, as jamb, string, quoins, &c., and stating the labours upon the stone, and that it includes joints, beds, and all labours.

Where rubble walls with comparatively thin brick backing are used, measure the *whole* wall as solid rubble and afterwards measure the brick backing as extra thereon. If hollow, measure the cavity in the cubic content and describe it with the extra for backing.

RUBBLE FOUNDATIONS *per yard cube.*—State whether in mortar or cement, whether random, random coursed, or coursed, and if the stones are of unusual size.

Walls 14-inch thick and under should be measured per yard superficial. Describe fully and state if fair both sides.

FACINGS *per foot superficial.*—State all as last, also the average thickness and the number of through stones per yard superficial, whether galleted joints, the kind of mortar, and how pointed.

ARCHES.—*Number extra only on facings,* stating the length and depth (including cutting in the description), and the kind of arch, as segmental, pointed, semicircular, &c.

## SLATER.

SLATING.—*Per square of* 100 *feet superficial.*

Measure the exposed surface, describe the kind of slates, if in promiscuous sizes, if from any particular quarry, the gauge or lap, the kind of nails, whether composition or otherwise, and number to each slate, and weight of nails per thousand if of copper, if screwed with copper screws, if torched or pointed underneath, if circular or vertical, or in small quantities. When in surfaces of irregular shapes measure the exact superficial content and describe as measured "net." If diagonal or fancy keep separate.

Deduct chimneys, skylights, traps, dormers, &c.

Allow for cuttings 6 inches by the length measured around the deduction.

Allow for double course to eaves and edges of curbs. The length by the gauge of the particular denomination of slates used.

Allow for cutting to hips the length by 6 inches on each side.

Allow for cutting to valleys the length by 6 inches on each side.

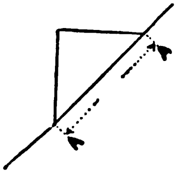
Allow for cutting to all irregular angles the length by 6 inches.

No allowance is made for cutting when the slating abuts against a wall or gable, if the plan is at right angles.

No allowance is made for cutting at ridge.

A roof however hipped has the same area as the simplest roof with gables at ends, provided that the slopes are similar.

FIG. 13.



Observe that where vertical slating occurs in dormer cheeks, the allowance for both eaves and cutting should be made along the lower edge adjoining the slope of main roof A to A, Fig. 13.

When there is a large number of dormers, skylights, &c., to a building, they should be deducted, and an item should appear as follows: "No. 24, allow for slater attending on plumber, and making good after him around skylights and dormers." When there is nothing more than ordinary, this item may be disregarded.

Observe that stone slates must have battens, even if boarding be used.

### WORK MEASURED AT PER FOOT RUN.

"Double Course of Slates (where no gable parapet) and Bedding in Cement and Cement Hollow Fillet to Verge."

Extra for close cut and mitred Hip bedded in red-lead cement and screwed with copper screws.

Slate Ridge and Hips.—Describe the diameter of roll and thickness and width of wings, if screwed with copper screws, if bedded in red-lead cement.

*Number* the fitted ends and intersections of ridges and hips.

### SLATE MASON.

Slate Slabs *per foot superficial*, allow in the measurement any portion let into wall. State whether rubbed or sawn, and if rubbed on both sides, or enamelled one or both sides. Give the size of each slab if more than 5 feet long and if more than 2 feet 6 inches in width. State if bedded against walls and if in cement, if screwed with copper screws to and including oak plugs.

### WORK MEASURED AT PER FOOT RUN.

Rounded Edge, state thickness of slate. Bevelled Edge, state thickness of slate. Sawn Edge, state thickness of slate. Groove. Rebate, state girth. Rebated Joint and state if in cement or oil cement. Double grooved Joint and Copper Tongue and state if in cement or oil cement.

Slate Skirtings.—State height, thickness and finish, whether bedded in cement, whether fixed with brass screws and including plugging. *Number* mitres or rebated angles.

Slate Louvres per foot run, state width, thickness and finish. No ends: housed on rakes or any labours to ends.

### WORKS NUMBERED.

Rounded Corners to Slabs, state girth and the thickness of slate. Perforations for Basins, state diameter and thickness of slate, and if rebated, rounded or dished, if for screws state if countersunk and size of screw. Notchings (stating thickness of slate and size). Lead Plugs and Screws, state if brass or copper screws and size of screw. Brass or Galvanized Iron Angle Plates and Screws, state number and size of screws.

Lavatory Tops.—State size and thickness and whether perforated and with rounded edge or of irregular shape.

Slate Cisterns.—State length, width, and depth, all in clear, or to hold water so many inches deep, or the number of gallons it shall hold, stating thickness and description of slate, if grooved together, if put together in red-lead cement, and describing the iron-work and including in the description all holes cut for supplies and wastes, or take the holes separately. State the height of hoisting and include fixing.

Chimneypieces.—For enamelled slate chimneypieces a sum is generally provided and the fixing included in the amount, or the fixing may be stated separately, and that it is to include all necessary cramps.

## TILER.

Plain Tiling, *per square of* 100 *feet superficial.*

Describe the kind and gauge of the tiling, if laid with gauge diminishing from eaves to ridge, whether laid dry or pointed, or torched, the nails or pins, if of oak, iron, galvanized iron, the laths (described and included with the tiling), if vertical or circular, and in the latter case what radius, if screwed with copper screws, if bedded on straw, if laid in lime and hair mortar.

*Deduct* chimneys, skylights, &c., and allow 3 inches by the length around same for cuttings.

Allow for cutting to irregular angles 3 inches by the length.

Allow for eaves the length by 6 inches.

Allow for cutting to hips the length by 6 inches, viz. 3 inches on each side.

Allow for cutting to valleys the length by 6 inches on each side; or where purpose-made valley or hip tiles are used, let the cutting be included in the description, thus:—"Extra for purpose-made valley tiles to course and bond with general tiling and including all cutting and waste."

VERTICAL TILING *per square of* 100 *feet superficial.*—Describe kind of tiles, the gauge, the battens, and if plugged, if the tiles are secured with screws, copper screws, or tenter-hooks. If with bands of ornamental tiles, state what proportion in quantity they bear to the plain ones. Make the same allowance for cuttings as to roof tiling.

### MEASURE AT PER FOOT RUN.

EXTRA ON TILING FOR PURPOSE-MADE HIP OR VALLEY TILES, and state if bedded in cement or mortar, state if to various slopes. Observe that this will not obviate the necessity of making allowance for cutting; the use of valley tiles where the pitches of the intersecting roofs vary is exceedingly inconvenient. EXTRA FOR BEDDING EAVES IN CEMENT. EXTRA VALUE OF "TILE AND HALF" AT VERGE TO BREAK JOINT. State if bedded in cement or mortar, if with cement fillet underneath. FILLETING. State if mortar or cement. RIDGE TILING, describe by reference to a trade list, state if to varied angles, number the splayed and fitted ends (where lower ridges run into plane of main roof). INTERSECTIONS, and state of how many ridges.

*Number.* HIP HOOKS.—State if ornamental, if of unusual shape, give sketch, and if possible the weight.

TILE HIP KNOBS, giving sketch or providing a sum for each. APEX TILES to top of hips, allow for the fixing.

Where ridges or hip knobs are to be obtained from a particular manufacturer, or if to special design, it is best to state it.

PANTILING *per square of* 100 *feet superficial.* Describe the gauge, the laths, and whether pointed inside or out, or both.

*Allow* the length by 12 inches for cutting to hips and valleys; for all other cuttings the length by 6 inches.

Note whether plain tile eaves are used, if so, add one and deduct the other and describe it as "plain tiling in narrow widths to eaves of pantiling."

### MEASURE AT PER FOOT RUN.

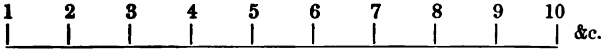
PLAIN TILE HEADING, HIP AND RIDGE TILES, and state if bedded in mortar or cement. FILLETING.

*Number* HIP HOOKS, and describe, stating weight.

## CARPENTRY.

The broad distinction between carpentry and joinery is that the latter is for the most part prepared at the bench and brought to the building ready to fix; the former is usually prepared and fixed at the building.

The surveyor should have ready for use paper scales each with divisions marked upon it corresponding with the centre lines of joists, rafters, or quarters at the usual distance apart (12 inches) for 2-inch, 2¼-inch, 2½-inch, and 3-inch joists respectively, for scales of ⅛ inch and ¼ inch to a foot, thus:—



3-inch joists. Scale, 4 feet to an inch.

These scales will save him some time and liability to error in the calculation of the number of rafters or joists required in a given space. You must not take for granted that the number shown on the drawings is the correct one.

Where the work is framed, make allowance in the length for tenons. In this respect carpentry differs from joinery, tenons not being measured in the latter.

Wrought timbers may be either measured at per foot cube, as fir framed, in floors or roofs as the case may be, and the "planing on fir" measured superficially, or may be measured at once, where there is much planing as in exposed roof trusses, as fir wrought and framed, the latter method usually produces a lower price.

Measure all timbers not exceeding 3 inches square at *per foot run*, stating what they are; also up to 4½ and 3½ in small quantities.

Measure all timbers under 2 inches thick at *per foot superficial.*

For scarfings to purlins, &c., where the scarfing is not over a principal or other bearer, allow a length equal to four times the depth of the timber every 20 feet; take the necessary bolts or straps to the scarfings.

Allow for laps to plates 6 inches in every 20 feet, and at angles 12 inches.

All timbers over 25 feet in length, or more than 15 inches in depth, should be kept separate.

Keep separate items of fir fitted to iron, as to iron joists or stanchions.

Ironwork in straps and bolts should be measured with the timbers to which it is attached; it is either described as "ironwork in straps and bolts, including perforations and fixing by carpenter," or as "straps and bolts," and the fixing made a separate item in the carpenter's bill. The former way is the better one. (See preamble, Smith and Founder, p. 156.)

Collect joists, rafters, plates, &c., as much as possible, as it saves much labour in the squaring and abstracting.

Specified sizes of timber (in the absence of any stipulation to the contrary) are held to mean those sizes minus the waste caused by the saw cuts.

Where timbers are specified to be "finished sizes when fixed," no allowance is made in the measurement beyond the specified scantlings, the waste in sawing will be met by a clause in the preamble to the bill of the trade, stating that the sizes are to be "finished sizes," and that no allowance has been made for this in the measurement.

If the timbers are wrought and "finished sizes" allow ⅛ of an inch for each wrought face for loss in planing, thus—4 inches by 3 inches wrought all round will appear in the dimensions as 4¼ inches by 3¼ inches, or the timbers may be measured without allowance for waste, and superficial dimension taken of "wrought face on fir including waste."

In measuring wrought face on a plate, observe to take it on three sides, although only one exposed. Working one face only leaves rough edges.

Keep different kinds of wood, as fir, oak, teak, &c., separate.

Where chamfers, mouldings, rebates, &c., are stopped state it.

Keep separate any part of the work which is in small quantities or inserted, or both.

### MEASURE AT PER FOOT CUBE.

Fir in Plates.

Fir in Lintels.—If framed, keep separate; in default of instructions allow 9 inches longer than width of opening.

Wood Bricks.—Take these as a running dimension; as they are usually all of the same scantling, they can be cubed after they are collected in the abstract. In the absence of instructions, assume that they are 2 feet apart.

Fir in Ground Joists and Sleepers, kept separate from other floor joists.

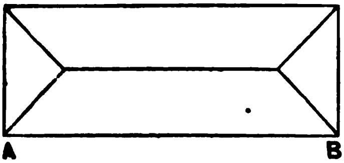
Fir framed in Floors.—All floors are taken as framed except ground floors. Take trimmings and deduct joists to voids. Collect the joists of the various scantlings.

The different lengths of joists in a room, in consequence of projection of chimney breasts, are better measured as they present themselves instead of deducting for chimney breasts. (See Collection of Joists, p. 287.)

Fir in Girders.—State if sawn down and reversed, if bolted. Take flitches, bolts, and all labours upon the girder at the same time.

Fir framed in Roofs, as Purlins, Ridges, Valleys, Hips, Dragon pieces, Rafters, Pole-plates, Angle-ties.

Fig. 14.



Observe that in the case of a hipped roof, the rafters may be collected from the extreme length A to B, the ends of roof being disregarded, except that one rafter shall be added for centre of each end, as a roof, however hipped, has the same surface as a gabled roof, provided that the slopes are similar.

Fir framed in Roof Trusses.—Keep separate. Take the king or queen posts at their largest scantling. It is a common practice to deduct one shoulder from the king posts and half a shoulder from the queen posts; but this should not be done unless the piece cut out is as much as 3 inches thick and as much as 3 feet in length, and should be measured 3 inches short of the length between the shoulders. The majority of surveyors, and rightly, deduct nothing.

Ceiling Joists—Stretchers and Hangers.—If small, the rule as to running them would apply. (See introduction to this trade.)

Fir framed in Quarter Partitions.—Quarters, heads, and sills; posts, interties, braces, &c. (See example for collection, pp. 288 and 335.) If trussed, state it, and keep separate. Measure the nogging pieces at *per foot run*, stating size. *Number* the bearers or bridging pieces to support sill, and give their scantling and length, and describe them as framed between joists. (These are taken in cases where the sill runs parallel with joists, and would be not more than 2 feet 6 inches apart.)

In default of special directions for brick-nogged partitions, take the quarters 3 feet apart, the nogging pieces 2 feet apart.

## MEASURE AT PER SQUARE OF 100 FEET SUPERFICIAL.

Boarding to Roofs.—State the thickness, if edges shot, if traversed, if wrought one or both sides, if beaded or V-jointed one side, if grooved, if matched, if tongued with hoop iron. If in small quantities state it, and keep separate. If boarding is laid on felt keep it separate.

Allow for cuttings 3 inches by the length on each side of all hips and valleys to irregular angles and around all deductions.

Battening for Slates.—State the size of battens and for what slates they are spaced. Allow for waste as directed for roof boarding.

Boarding to Flats, as for roofs, but state that it is to flats and that it includes firrings.

Sound Boarding, state thickness and that the space occupied by the joists is included in the measurement; give size of fillets, and state if single or double fillets.

Wall Battening.—State size of battens and distance apart, and if plugged.

Weather Boarding.—State thickness, if wrought both sides, if beaded, the width of boards and the lap; measure the net finished surface, and let part of the description be "allow for laps."

## MEASURE AT PER FOOT SUPERFICIAL.

Wrought Face on Fir, including Waste, where no allowance has been made for size of timber lost in the planing.—Take planing on fir where an allowance has been made; measure at same time mouldings, rebates, &c., not exceeding 6 inches girth per foot run over 6 inches per foot superficial.

Eaves Boards, Flashing Boards, and Valley Boards.—State thickness and if feather edged, state that the valley boards include the necessary splaying and fitting.

Felt.—State the kind, describe the nails, and that it is measured net, and that allowance is to be made for laps.

As this varies very much in quality, state the weight per foot superficial in ounces, or the weight per sheet, stating size of sheet, and give name of patentee.

Circular Ribs to Roof Trusses.—Measure the full quantity of timber out of which the ribs are cut. Keep them separate. State thickness, if wrought and framed, and if including joints say so; if not, take the joints separately, and in either case say if the joints are dowelled together.

Ribs in Thicknesses.—Where circular ribs are formed of thicknesses of deal, measure the exact quantity of deal in them, stating its thickness, and describe it as in ribs of certain thickness bolted together and measured net. Take the *cutting to edges* separately. Take the bolts.

FASCIAS.—State the thickness, and if rough or wrought one or both sides, if beaded, but generally better measured lineal.

BRACKETING TO CORNICES.—Measure the girth of the face of the bracketing by the length. Take the run of fillet to attach brackets to, stating size. Number the angle brackets, and describe as "extra for." Keep that which is circular on plan or in small quantities separate. State thickness of the wood used.

Bracketing is sometimes measured at per foot run, stating the girth of cornice for which it is required; but the former method is to be preferred.

In the absence of details of cornices about two-thirds of the girth of the cornice may be taken for the bracketing, but as a rule, none will be required for cornices under 12 inches girth.

CRADLING, and state what to, as entablatures, and if fitted to iron.

FILLETING AND COUNTERLATHING TO PARTITIONS, including the quarters in the measurement, and stating that such has been done.

GUTTER BOARDS AND BEARERS.—State thickness of boarding and size of bearers, and whether bearers are framed.

Where gutters do not exceed 6 inches wide take them at per foot run, stating the average width.

*Number.* "EXTRA TO REBATED DRIPS IN GUTTER," or "SHORT LENGTHS OF REBATED DRIP," SHORT LENGTHS OF ROLL. The two latter may be so described up to a length of 30 inches, over that length measure at per foot run. CESSPOOLS, stating thickness of deal and length, width, and depth, all in clear.

Where parapet gutters occur take rough fillet (giving size) and plugging to wall to receive ends of bearers.

SNOW BOARDS.—State size of battens and bearers, and the distance apart of both, and that they are to be made movable, and in . . . feet lengths. Where the gutters are under a foot wide measure *at per foot run*, stating average width, and describing as before.

## MEASURE AT PER FOOT RUN.

The **Circular Sunk Edge to Ribs, Chamfer, Rebate, Groove**, stating girth or width.

**Valley Fillet, Tilting Fillet, Eaves Fillet**, giving sizes in each case.

**Mouldings.**—State girth and what out of, as 4 inches by 5 inches.

**Hip and Ridge Rolls.**—State size, if birdsmouthed, if spiked on. Take two rough chamfers to ridge and hips if roll is birdsmouthed.

**Strutting.**—State if herring bone and give size, or if solid give thickness; state depth of joists, and that the joists are measured in the length.

**Feather Edged Springer** to trimmers, state size.

## NUMBER.

**Sprockets.**—State what size two are cut out of, or the length, breadth, and thickness of each.

**Cut Ends to Rafters.**—State if moulded, and if wrought for what length, and the size of rafters.

**Extra Labour to Scarfings**, stating size of timber, and include the bolts, stating their number and size, billing all together.

**Hip Knobs.**—State size, and how many rafters are framed into each, if fitred out or turned, describe it.

**Cleats.**—State size and if wrought. **Hoisting and fixing Roof Trusses.**—State width and height of truss, and distance from ground to ridge when fixed. (Some surveyors only take this item to very large trusses.) Bell cots and flêches are often hoisted after they are framed, and should be numbered in a similar manner.

## CENTERING.

To **Vaults** *at per square of* 100 *feet.*—State that it includes horsing, where it is possible to strut it up from floor, and state height of story. If the vaulting is groined keep the *centering* separate, and state that it is to groined vaulting.

*Measure at per foot run.* EXTRA FOR GROIN POINT to centering. EXTRA FOR SPLAYED CUTTING to centering.

To APERTURES *at per foot superficial.*—Where the soffits exceed 9 inches in width, state if the soffits are straight, segmental, semicircular, pointed, segmental-pointed.

*At per foot run* where the soffits do not exceed 9 inches in width, stating the kind of curve as before, and these are sometimes described as turning pieces.

In the case of relieving arches to facings, centering will be required if the facing below them is filled in after they are constructed.

Some surveyors keep centering to *gauged* arches separate, as it is not unfrequently close boarded and more expensive than centering constructed of fillets nailed across the ribs.

Observe that chimney bars will serve for centres to openings of fire-places.

To TRIMMERS *at per foot superficial.*—State if the centres are left in for lathing to, or number "filleting soffits of trimmers."

NUMBER. CENTRES to openings over 10 feet span, stating width of opening, girth, width of soffit and kind of curve.

STRUTTING TO STONE LINTELS.—(In windows of several lights take one to each light.) STRUTTING AND RIBBING TO TRACERIED WINDOWS, giving clear width and height, and stating the number of lights or averaging the superficial contents, and describing as "strutting and ribbing to traceried windows ....feet superficial each (averaged)."

EXTRA ON CENTRES FOR NOTCHING FOR KEY-STONES. EXTRA ON ENDS OF CENTRES TO FITTINGS SAME TO JAMBS.—Where centres can be re-used, count each instance of taking down and refixing, but it is seldom possible to do this, or take all as new and by a clause in the bill call the contractor's attention to the possibility of re-using some of them.

FENCES *at per lineal rod of* 16½ *feet.*—State if deal or oak. Give size of posts (length and scantling). State if butts are charred. State distances apart of posts. Give size of rails; state if square, arris or "cant," and their number. Describe gravel boards. Describe the pales, state whether cleft or sawn, and the total height of the fence. State what parts are wrought or if merely sawn. As pales are generally cleft very thin, if a substantial fence is required their thickness should be stated.

## JOINER.

Keep the different kinds of wood separate.

Describe all work as cross-tongued where over 9 inches in width, if in deal or pitch pine, 12 inches American walnut.

Where the work is in small quantities, or short lengths, or circular, keep it separate, and observe generally that very small things where possible should rather be numbered than measured by the foot, superficial or lineal.

Circular work to be described as "flat sweep" when the rise is ½ an inch to a foot of chord line; quick sweep when more than that. Where in circular cupboard fronts, wreathed strings, &c., state that the work is to include cylinder.

The custom of describing the radius instead of using the terms quick or flat sweep is becoming very general, and is perhaps to be preferred.

If work is screwed instead of nailed, if secretly nailed, if fixed with brass screws and cups, state it.

If work is to be of selected deal, and to be stained, keep it separate from the parts painted.

Where work is unusually constructed and cannot be quite intelligibly described, give sketch.

In collecting dimensions on waste ½ inches will be used in widths only, but in lengths and in transferring the resulting length to your dimension column call any part of an inch 1 inch.

Backings are sometimes included with the article measured, state in all cases if framed or dovetailed.

Take plugging at per foot run to the edge of all joinery next brickwork, where there are no grounds or other attachment, and add the word plugged to the description of any other joinery adjoining brickwork which is fixed by plugging, but observe where wood bricks have been taken for fixing of *frames, &c.,* the plugging will not be necessary.

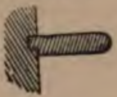
Notching should be measured to any work really notched to fit a projection, the thickness of the wood and the girth of the notching to be stated; notchings to materials of same thickness may be averaged.

Where work is of irregular shape measure it net (that is the exact superficial quantity) and take scribing at per foot run to the irregular sides, stating the thickness of the wood. Scribing is sometimes claimed unjustly, as for edges of shelves against plastering. Where the plan is not irregular this should not be allowed, as the face of plastering, if floated, should be sufficiently near to a true plane to obviate the necessity of scribing; but if the plaster is not floated scribing may be allowed.

Wrought both sides includes wrought edges, wrought one side includes one edge wrought.

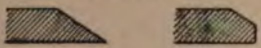
Observe to use the words tongued or rebated in their proper places; a familiar instance of their misapplication is in the case of window boards and window nosings which are rebated thus, Fig. 15, and are frequently described as tongued.

FIG. 15.



Let the words "splayed edge" always be used when the whole thickness is dealt with, "chamfered edge" when part only. Thus:—

FIG. 16.



Where joinery is described to be of "finished sizes," no allowance is usually made in the measurement, but it should be stated in a clause of the preamble of the bill; it is, however, better, in addition to the statement in preamble, to give in the bill the actual thickness of the work as $1\frac{1}{8}''$ floor when reputed $1\frac{1}{4}''$ floor is intended, &c.

Joiners' work is generally described as of the thickness of the stuff it is produced from. An $1\frac{1}{2}$-inch door will measure about $1\frac{5}{16}$ inch.

Deal framings wrought one side will measure $\frac{1}{8}$th less than the reputed thickness, wrought both sides $\frac{3}{16}$ths. Wainscot, wrought both sides, ¼ to ½ an inch less.

In some cases, where the sizes generally are not intended to be finished sizes, an architect produces details of work which must of necessity be finished of the size shown or the design would be altered; in such cases the surveyor must state it, as, for instance, "20 feet run, 5 inches by 4 inches (finished) frame, rebated and moulded 3 inches girth," and where much work is moulded to detail finished sizes should be specified.

The sooner this anomaly is got rid of the better; it is to be wished that all architects would describe their work as of finished sizes. Scottish architects nearly always do so.

In measuring running lengths of labours, as to moulding, begin with the words "Labour to," as otherwise the item may be mistaken by the abstractor for an item of labour and material.

In describing joinery, square framed is always held to mean square framed both sides, but in all other cases, as moulded, bead, flush, &c., it is better to describe as "moulded both sides," bead-flush both sides, moulded and square, bead-flush and square, &c.

Some country builders erroneously argue that square framed only indicates the rectangular shape of the piece of framing, not its section.

Where the panels of framings are very small, or of irregular shape, it should be stated, and the average superficial contents given: thus, "1¼-inch moulded and square bath enclosure one panel high, the panels averaging 12 inches superficial each."

All doors and framings under 5 feet in height must be kept separate and described as dwarf, unless from their nature they cannot be otherwise, as window backs.

When framings are rough on one side and square framed, no notice need be taken in the description, if flush framed, state the thickness of the wood in the panels.

In measuring finished framings nothing extra is allowed for the tenons, but in cases where a frame or similar work is measured in separate parts the tenons must be measured in the length.

When a piece of work has various labours on it, mouldings, rebates, &c., it should either be run including all the labours in the description or measured superficial, omitting from the description the labours in question, and measuring them per foot run separately.

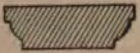
Take the ironmongery with the joinery to which it belongs.

French polishing is not unfrequently included in the joiner's bill, with the description of the work intended to be polished.

In describing mouldings to doors or framings, be careful to state if they are on solid, and if they are stopped.

When an edge is chamfered, state whether once or twice chamfered, and in such things as architraves whether once or twice moulded, as sketch.

FIG. 17.



If any mouldings are to detail state it, otherwise machine-made mouldings are intended.

Small mouldings up to 3-inch girth may have the mitres included with the description, and if the purpose of the moulding is stated, the item can easily be priced, but if there are many more mitres than are usual for such a purpose, separate them.

Sometimes much labour may be saved by averaging the sizes of doors or windows.

When a piece of joinery is of small size and with much labour on it, the surveyor will usually find it best to measure it at per foot run, or to number it; as if he measure it at per foot superficial, the extra labour will make a large number of items.

In describing labour to edges of joinery, state if any part is "cross grain," and keep it separate; it is sometimes expedient, when the labour is of small value, to keep it all together and describe as "part cross grain."

FLOORS, *per square of* 100 *feet superficial.*—State the quality and thickness, and whether deal or batten. If of unusual widths state it, whether rough, edges shot, folding, straight joint, splayed headings, tongued headings; if dowelled, if grooved, if side nailed, if tongued and the kind of tongues, if traversed and cleaned off at completion, if covered with sawdust after laying.

Take separately all flooring in recesses and doorways, and describe as "in small quantities and bearers."

Allow 3 inches by the length for all raking cutting.

*Deduct* chimney breasts, projections, and voids, but not hearths.

SINKINGS FOR MATS.—Measure a running length of "extra on 1¼-inch floor for glued and mitred border; and 1 inch by 1½-inch wrought fillet rebated both edges and two grooves in floor," or as the case may be.

*Measure at per foot run*—

SCRIBING EDGE OF FLOOR TO STONE PAVING where it adjoins the wooden floor.

SCRIBING FLOOR to brickwork where actually scribed.

MITRED BORDER TO HEARTHS if the slabs are deducted, but this is rarely done. The usual plan is not to deduct the slab, the excess of floor being considered sufficient set-off to the mitred border.

If the sizes of slabs are not settled, as is frequently the case, deduct the hearths, and leave the mitred border to be supplied and fixed in day work.

SKIRTINGS, *at per foot run.*—State the thickness, the height, and if it includes backings and narrow grounds. (These latter are usually included in the description.) If it is tongued to floor. If the moulding is of greater size than usual state its girth. If in two or more pieces state the size of each and how put together, and state size of moulding and total height. If plugged or fixed with wall-hooks keep separate.

For very ornate skirtings it is better to give a sketch in addition to the description.

*Number* TONGUED AND MITRED ANGLES, IRREGULAR ditto (only necessary to distinguish these last when a large skirting of several pieces), HOUSINGS (as to architrave bases), FITTED ENDS (as to chimneypieces), RETURNED ENDS, TONGUED AND MITRED ENDS, HEADING JOINTS.

The running length around the room is sufficient for the quantity, where in very long lengths heading joints occur, but where the length is under 20 feet these are usually disregarded. Collect skirtings minus the width of the openings; it is mere waste of time to collect the whole round of the room and deduct the opening, as some do.

DADOS, *per foot superficial.*—Take the round of the room, minus openings, and at the same time deduct the plastering behind it, the same dimensions serving both purposes. Measure at per foot run, capping, housings tongued and mitred, or rebated and grooved angles (internal), rebated, grooved and moulded angles (external).

GROUNDS, *per foot run.*—If under 3 inches in width call them simply narrow grounds, in all other cases state width and thickness, if framed (as behind architraves), splayed, grooved, beaded, or chamfered. State if circular on plan or circular both edges, if skeleton. Where over 3 inches in width measure at *per foot superficial.* In good work grounds should be taken to edges of all work where it comes against the plastering, and framed wherever it is practicable.

Pilasters are often fixed to skeleton grounds; and although much of the surface is void, measure the whole surface superficial including the voids.

SKYLIGHTS, *per foot superficial.*—State thickness, if chamfered or moulded bar, approximate distance apart of bars, if put together in white-lead, if screwed with brass screws.

*Per foot run.*—Labour to throat. To splayed edges if splayed, stating thickness.

*Number* the sets of fillets for condensation, state if teak, oak, or deal, if screwed with brass screws, and the average length in each set, or sinkings for the same purpose in bottom rail, stating size and depth.

SKYLIGHT CURBS, *per foot superficial.*—State thickness, whether dovetailed, put together in white-lead, beaded or grooved.

SASHES AND FRAMES, *per foot superficial.*—To the height of the external opening from top of stone sill to soffit of arch add 3 inches for the height and to the width between the external reveals 9 inches for the width.

Where with semicircular, or pointed heads, keep the part above the springing separate, and state that it is "in semicircular (or pointed) heads to sashes and frames measured square," and state the number of frames, if segmental headed, measure all together, and describe as "sashes and frames with segmental heads measured square."

If circular on plan keep separate and state it.

*Number* any sash and frame under 12 feet superficial, stating the extreme dimensions of breadth and height.

State the thickness of outside, inside, and back linings, and of pulley stiles, and whether the pulley stiles are of a different wood, the size of sill, and whether of oak or teak; whether sunk, double sunk, weathered, throated, check-throated; the thickness of sashes, whether moulded or chamfered, if hung with iron or lead weights, if weighted for plate glass, if with parting slips of stout zinc; the description of lines and pulleys, if single or double hung or fixed, if the frames are grooved all round for linings, if with margins at sides or all round, if in single squares, if in small squares (under 1 foot superficial), if the bars are unusually thick give their size, if in Venetian frames state which of the lights are hung and which fixed.

If the sash weights are hinged state it; if specially good sash-lines are required, state the maker's name and the number in his trade list.

*Measure at per foot run* any unusual labours to bottom or meeting rails as rebates or grooves, groove in sill, iron tongue, and state if galvanized, painted, or bedded in white-lead.

If sashes and frames are fitted to stone mullions and transoms they frequently require a greater width of lining. This may be either measured at per foot run as "extra" on sashes and frames for extra wide linings to mullion or transom, or included in the general description.

*Number* moulded horns to sashes, if the mouldings and rebates are stopped to form these say so, stating thickness of sash, sash fastenings, sash lifts or hooks. State if lifts are sunk. Brass eyes and plates. Poles and ends ("long arms"), stating length of pole, its diameter, and of what wood, and the kind of end. Sets of lines, pulleys, and hooks or cleats, describing their use and the height of top of sash from floor, and whether iron or brass work.

SHOP SASHES, *per foot run.*—Measure the length of bar, rail, head-bead, guard-bead, &c. State if they are moulded, how many times rebated, &c., and state the size of each part.

WINDOW LININGS, *per foot superficial.*—State thickness, whether rebated to frames, beaded, tongued at angles, rounded on splay; if moulded, and in how many panels the set; if under 6 inches wide measure at per foot run; and state the labour upon them, soffits with splayed ends should be measured to their extreme points.

WINDOW BOARDS AND BEARERS, *per foot superficial.*—State the thickness, whether rebated, rounded with moulding tongued under, giving size of moulding, if under 6 inches wide measure at per foot run.

*Number* the fitted ends, the notched, returned, and mitred ends.

WINDOW NOSINGS, *per foot run.*—State width and thickness, and if with moulding tongued under, if rebated to frame, if rounded.

*Number* the fitted ends, the returned and mitred ends.

In good work separate the window board or window nosing and the moulding beneath.

ARCHITRAVES, *per foot run.*—Measure round the outer edge of the architrave for the length, including the plinths (if any) in the measurement of the length. State the size. If in two pieces, state it, and give the size of each piece. If of unusual section give a sketch. Include the mitres in the description, when in deal, but in hard woods take "tongued, mitred, and screwed angles."

*Number* the plinths, and describe as "extra on architrave," stating width, height, and thickness. State if moulded or splayed. If the architrave is dowelled or dovetailed and screwed to the base, include it with the description of base.

When a part of an architrave only is to be used, because of limited space, measure as a whole architrave and take scribing in addition, as the whole architrave will have been produced by the machinery.

SOLID FRAMES AND CASEMENTS.—Measure the frame and transom and oak sill at per foot run, giving size. State if rebated, beaded, staff-beaded, moulded (give girth of moulding). Make the same allowance as in door frames (which see, p. 84). Describe transom and sill as framed. Measure the casements at per foot superficial. State thickness, if moulded or chamfered, if fixed, hung on hinges or centres, hung folding (in which case add an inch to the width for rebate), if in small squares.

*Per foot run.*—Labour to water hollow around frame or casement. Labour to hook rebate. Water bar, stating size, if galvanized, if bedded in white-lead, if patent. Weather fillet, state size, if rebated, weathered, or moulded.

*Number* the casement fastenings, the stays, patent water bar (stating whose patent) stating length, and if for folding casements; the pairs of centres, stating if bushed; flush bolts, giving length and width; espagnolette fastenings height of casement.

WINDOW BACKS AND ELBOWS, *per foot superficial.*—State thickness, in how many panels, if square framed, moulded, flushed framed, keyed, if on splay. If canvassed and painted at back include in description or measure it at per foot superficial.

*Per foot run.*—The capping, state width, thickness, if tongued, if rounded, if moulded, or with moulding tongued under, or simply call it beaded capping, if the common beaded capping and housings. Number the fitted ends and housings.

BOXING SHUTTERS, *per foot superficial.*—State the thickness, the number of panels, if moulded, if moulded and square, moulded and bead flush, bead butt, in how many heights hung. Add 1 inch to the width for each of the rebates. Keep the back flaps separate.

*State* that they include all rebates and splay rebates.

*Number* the elbow caps, and the clearing pieces, stating size of each, the shutter bars, giving length, shutter knobs, shutter latches, pairs of butts, pairs of back flaps, stating size in each case.

SHUTTER BOXINGS, *per foot superficial.*—State thickness, if framed, rebated, beaded, splayed, how many times grooved. If flushed with wall they are usually called boxing grounds.

BACK LININGS, *per foot superficial.* — State thickness, if panelled, how many panels in height, if moulded, square framed, bead butt, bead flush, &c. State if splayed.

RETURN LININGS, *per foot run.*—State thickness, and if rebated or grooved.

SLIDING SHUTTERS.—The only proper way is to measure these in detail, the shutters at per foot superficial, stating the kind of pulleys, lines, and weights, the thickness, and if moulded, bead flush, &c., the pulley stiles, heads, &c., at per foot run, describing the labour upon them; or per foot run deal-cased frame for single (or double) hung shutters, describing the various parts, as linings and pulley stiles, as directed for sash frames.

Some surveyors measure shutter and frame together as they do deal-cased frames and sashes, but this is an inexact method.

*Number* the flush rings or drop rings, the lifts, pairs of butts, thumb-screws, &c.

Measure the flap at per foot run, stating thickness and width, and if rounded or moulded.

LIFTING SHUTTERS, *per foot superficial.*—State thickness, if square framed, moulded, &c. State if rebated (as for shop shutters), and allow for the rebate in the measurement.

*Per foot run.*—The moulding or fillet, if any, on face of door to receive shutter, giving size and description.

*Number* the thumb screws. The stubs and plates. The shutter shoes, state if screw heads are countersunk or if the shoes are patent.

REVOLVING SHUTTERS.—These are best treated as a provisional sum. The trade lists of the well-known manufacturers show the allowances required beyond the visible measurement for grooves and coil, and the minimum superficial quantity for which they charge (as anything less than 20 feet as 20 feet). Measure the letting in and forming grooves at per foot run.

Measure coil casing at per foot superficial.

Provide a sum for attendance in all trades.

DOORS.—Refer to your dimensions or deductions of brickwork, and for external doorways assume the doors to be of the same size as the deduction of external openings. For internal doorways assume the doors to be 3 inches less in width and height respectively than the deduction.

Keep folding doors separate. Allow 1 inch in the width for the rebate. If the rebates are specially moulded or hook-rebated take the extra labour at per foot run. Measure doors with segmental or segmental pointed heads as if square, taking the extreme dimensions, but stating that they are segmental or segmental pointed-headed measured square.

Separate the semicircular heads of doors from the part square, and describe the quantity as in semicircular heads to doors of description as the case may be.

Where both leaves of folding doors are intended to open simultaneously, take "sympathetic hinges." State whether glazed doors have diminished stiles. Where doors are to be covered with cloth state it, and include the cloth in the description. The doors must be described as flush framed.

To doors hung with rising butts, take run of splayed edge to top rail, and in very good work to head lining, a dimension of labour to splay...inches wide.

When doors or framings are polished, take to edge of each lock and hinge stile "⅝ inch mahogany (or other wood) dovetailed slip to edge of 2¼ inches door and letting in and glueing."

DOORS LEDGED, *per foot superficial.*—State if tongued, grooved, and beaded, if braced. Almost invariably hung with cross garnet hinges or strap hinges.

An "inch proper ledged door," means a door of 1-inch ledges covered with 1-inch boarding. a "¾-inch proper ledged door," ¾-inch boarding and ¾-inch ledges, &c.: if anything different to this usage is intended, it must be described.

**Doors Framed and Braced**, *per foot superficial.*—State the *total* thickness, if crossed-braced, if stop-chamfered including stops, if *covered* with boarding, if *filled in* with boarding, state thickness of boarding, if in narrow widths, if grooved, tongued, and V jointed or beaded one or both sides, if filled in diagonally.

If the door is filled in with boarding and converted on the inside into a number of panels state it, and give their number and average size. If the boarding and framing are of different wood state it, and in such case describe the doors as of skeleton framing....inches thick, covered with boarding, giving description and thickness.

*Number* the fastenings, pairs of hinges, &c.

**Panelled Doors**, *per foot superficial.*—State thickness, the number of panels, if square framed, bead flush, bead butt, moulded, bolection moulded, if the latter state if mouldings are rebated to stiles and rails, if mouldings are tongued in or tongued and mitred at angles, state it.

If folding state the number of panels "*per set*" doors, not the number in each leaf, and allow in the width for the rebate.

State if "prepared with and including" shifting beads for glass, and if the beads are secured with brass screws or brass screws and cups, or if the doors are prepared to receive sashes. In this latter case measure the sashes in addition and describe them as "fitted to panels of doors." State if any of the panels are filled in with and including wire gauze or perforated zinc and include the beads in the description.

In the absence of a drawing of glazed doors, assume that the top of the middle rail is 3 feet 2 inches from floor.

**Gates**, *per foot superficial.*—State thickness, and describe generally as for framed and braced doors (which see, above).

*Per foot run.*—The capping. State if beaded or moulded, and if of teak or oak.

*Number* wicket and describe as "extra for wicket," giving size and description; take the fastenings.

**Gate Posts.**—Stating size and if the butts are charred.

*Number* the cut ends and give sketch.

In the case of an ornamental gate it is advisable to give a sketch and state the kind of gate and the number of feet of stile, rail, braces, with sizes and labours that it contains, written short in bill.

Door Frames, *per foot run.*—State size; if wrought, rebated, chamfered, or beaded, and how many times rebated, chamfered, &c. To the collected length of the sides and width of the door add four times the width of the frame, and 6 inches for the two horns. Where tenoned into sill, allow further 2 inches for each tenon. Where not tenoned, take "iron dowels and mortises in fir and York (or other) stone"; the latter usual for all external doors.

Where frames are wrought, rebated and beaded, they are sometimes (very rarely) measured at per foot cube and described as fir *proper* door frames, but the former method is the most convenient and best.

Where frames are semicircular or pointed headed, measure the frame to 3 inches above the springing as straight, and the girth of the outer edge of the circular part from the springing as circular. If the head is to show segmental outside and square inside, the size out of which the head is obtained should be stated, and it should be kept separate.

*Number* the heading joints and sets of oak keys and wedges, or handrail screws, and fixing.

Describe circular parts of frame as of 5-inch by 4-inch *finished*, or as the case may be.

If frames are in two or more pieces, cross-tongued and glued together, state it, and give sketch.

*Number* "extra for irregular framings" to angles which are not square. The term frame covers square angles only, state the scantling of frame.

If oak sills to door frames, measure at per foot run and state size and labours.

Oak Foot-boards to Loophole Frames *per foot superficial.*—State thickness if wrought both sides, if cross-tongued.

*Number* the sets of strap hinges and chains, stating size and weight, and how many bolts.

*Number* the bow handles, stating size and weight.

*Jamb Linings, per foot superficial.*—Add to the collected length of two sides and top of the door four times the thickness of the linings for the length. State thickness, if on splay, if single or double rebated, if tongued at angles, if once or twice beaded and moulded, if panelled (and state the number of panels in the set), if tongued on one or both edges. Where in two pieces, it is better to measure the lining at per foot run, describing the pieces. State in all cases that they are to include backings, and if they are dovetailed backings, or the dovetailed backings may be numbered.

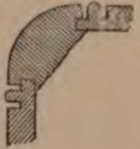
FRAMINGS, *per foot superficial.*—State thickness, if panelled, if in small or irregular shaped panels, the number of panels in height, if spandril-shaped, in that case measured net and so described. Deduct the doorways, or if the doors are uniform with the framing, let the measurement include the door, and number them, and describe as "extra for forming four-panel door in same," the item following the framing in the bill and written short; in either case, take the stops, rebates, and ironmongery in addition.

*Number* extra on framings, describing them, as for instance, to undersides of girders, stating size of girder. Notchings, giving their girth and stating thickness of framing.

*Per foot run.*—Rebate on framing or on edge of doors. Door stops, stating size and if rounded, twice rounded, chamfered. The mitres to be included in the description.

Where quadrant corners occur, measure the framings short of them and measure the corner per foot run: thus, "8 feet run, solid quadrant corner 6-inch girth out of $2\frac{1}{4}$-inch deal, beaded, and grooved, both edges as sketch," or as the case may be.

FIG. 18.



W.C. FITTINGS, *per foot superficial.—Observe* that 20 inches is the least width that should be taken for a good w.c. seat. Where seat and riser are plain they may be kept together, where there is a difference between the two keep them separate. State the thickness, and include in the description deal-framed bearers, or the bearers may be separately measured; if the bearers are dovetailed state it.

The flap and frame *per foot superficial.* State if mortise clamped, or mortise and mitre clamped, if frame is beaded, moulded, or chamfered. Number "button blocks," "thumb cuttings," &c.

Backs and Elbows, *per foot superficial.*—State thickness and if square-framed or moulded.

*Per foot run.*—Skirting, giving description. Moulded nosing tongued on (state girth). Rounded edge to flap or seat. Capping to back and elbows, state size and if beaded or moulded. Tongued and mitred angle to elbows. Grounds. State size in all cases.

*Number* mitres to skirting; holes cut and dished for pan. holes cut and beaded or chamfered for handle. "Extra for seat and riser made to remove easily, with oak button blocks and brass cups and screws" (or otherwise). Joiner attend plumber to w.c. Joiner attend plumber to safe. Paper boxes, giving description.

The ironmongery.

Bath Fittings, *per foot superficial.*—State if fitted to remove. The top: state thickness, and that it is framed. Deduct the opening, and state that it is measured net. The enclosure, stating thickness, if panelled, if moulded. if in very small panels. The step and riser, describing thickness. State if any part is screwed with brass cups and screws to remove, or count the cups and screws.

*Per foot run.*—Skirting. Labours to rounded or moulded edges.

*Number*, extra on framing (of enclosure) for small door for access to cocks. Perforation in top. Deal framed cradle for bath. Joiner attend plumber to bath. Joiner attend plumber to safe. Quadrant angles to rounded edge.

Cisterns and Sinks, *per foot superficial.*—The bottom, state thickness, and describe as screwed, state if wrought both sides. The sides, state thickness, and describe as dovetailed, state if wrought both sides.

*Number.* Joiner attend plumber to sink or cistern, perforations for wastes.

*Number.* Shelf for gas-meter, giving description and how fixed. Ladders to traps, giving width and length, and size of sides and rounds; state if folding, and describe the ironwork. Plate racks: state size and description of parts. Dressers: state length and height, and give description, or provide a sum. The latter is the most frequent practice. Draining boards: state size and thickness, and that it is blocked up to fall and describe the grooving. If to be covered with lead state it.

Shelves, butler's pantry fittings, cupboards, should be taken out in detail.

COPPER LIDS.—State thickness and diameter, if in two thicknesses, if pinned with oak pins, if dowelled together, and describe the handle.

PILASTERS, *per foot superficial.*—Measure the girth by the height, state thickness, if glued and blocked, how fixed if not nailed, as screwed. If slotted screws, they should be numbered, and the work described as "fixed with slotted screws elsewhere taken." Measure tne salient angles per foot run, stating the labour. The caps, bases, and necking are best numbered thus: "No. 1. Base to pilaster 1½ inch by 15 inches and 12 inches high, moulded 6-inch girth, with two external tongued and screwed mitres and two 6-inch returns, the upper edge rebated, and the whole glued and blocked.'

COLUMNS of wood are best numbered with complete description; state how constructed, height, girth, cap, and base; if any part is carved describe those parts as prepared for carving and provide a sum for carving

STAIRCASES, be careful to see that there is sufficient headway, not less than 6 feet 6 inches. If the treads and risers are of different woods keep them separate.

Where the steps are curved on plan the risers must be veneered, and so described and kept separate.

TREADS, RISERS, AND FLYERS, *per foot superficial.*—Measure the width of steps, including the housings (¾ inch each), by the whole length of the area occupied by them on plan, plus the height from floor to floor. To this length add 1 inch for each tread where nosings are rounded, and 1½ inch where moulded.

State the thickness of treads and risers, if glued, blocked, and bracketed, if grooved and rebated together, if screwed together, the number and size of carriages, if rounded nosing, if moulded nosings, if with moulding tongued under, whether prepared for close or cut strings.

Winders, *per foot superficial.*—For the treads measure the size on plan, the width by the length, collect the length of the risers, multiply that length by the height from top of tread to top of tread, plus 1 inch for rounded nosings and 1½ inch for moulded nosing. Describe them in the same way as for flyers, and state in description that they are cross-tongued and measured net, and keep them separate from the flyers.

*Number* housings to treads and risers, stating whether rounded or moulded nosings. Housings to winders. Ends of treads notched and fitted to newels. Returned rounded or moulded and mitred nosings to steps, state if circular on plan. Cut brackets, state thickness, size, and if circular on plan. Curtail end to bottom step, and state length of step for veneered front to riser.

Wall Strings, *per foot run.*—State thickness, if moulded, if in two pieces give size of each and state how put together, if parts of the string are ramped for a length of 2 feet or thereabouts keep them separate and take a heading joint at each end, but if there are only short ramps, shorter than those last mentioned, describe them as "extra for short ramps," having previously measured them in the length of string.

*Number* the tongued and mitred angles, heading joints, fitted ends, returned moulded ends.

Outer Strings, *per foot run.*—State thickness, if framed, if cut and mitred, beaded, sunk, grooved, moulded, chamfered, if circular or wreathed, if in either of the two latter cases "glued up in thicknesses," and state size of well-hole or the radius of the curve.

*Number* ends framed on splay, if the string has not been described as framed.

Newels, *per foot run.*—State size, describing as wrought and framed, state if chamfered, moulded, stop moulded, and how many times, or the labours last mentioned may be separately measured.

*Number* stops splayed or moulded to moulding or chamfer; the turnings to newels, stating length; turnings to pendants, stating length; finials describe, and if put on, state how fixed and if of different wood.

HANDRAILS, *per foot run.*—State the size, whether rounded or moulded, if framed, if continuous, if ramped, wreathed, level circular, if fitted to iron core; if the moulding is of uncommon section give a sketch.

*Number* ends framed, if not described as framed, ditto on rake; joints and handrail screws, and state if joints are dowelled; lengths of wreathed or circular handrail where under 12-inch well-hole, stating length, and including the two joints and handrail screws in the description. Scrolls, stating size and including the joint and handrail screw, turned and mitred newel cap and joint, and handrail screw, and short ramp. Balusters, stating size and average length, if turned, and labour generally, if dovetailed to step, if housed to handrail. Iron balusters, with flapped ends, state size and length, what parts are let in flush, and if the heads of screws are countersunk.

APRON LININGS, *per foot superficial.*—State thickness, if moulded, beaded, sunk, rebated, grooved, circular on plan.

*Number* short lengths of circular or wreathed, state length, width, and all labours, and include two heading joints in the description, and state radius; tongued and mitred angles.

NOSINGS TO EDGES OF LANDINGS, *per foot run.*—The superficies measured with the landing and described as "extra for nosing," &c. State thickness, width, and labours, if tongued to edge of floor. *Observe* that in counting the housings of steps the housing of this nosing should be counted and included with them.

DEAL CORNICES, *per foot run.*—State the girth of the moulding, how it is put together, and the thickness of the wood, and include backings with the description.

*Number* the mitres, housings, &c.

CHURCH FITTINGS.—The joinery for church fittings will present little difficulty; the same principles will apply to its measurements as to the work dealt with in the foregoing pages.

The seats, book-boards, &c., will be measured at *per superficial foot* and the extra labours upon them measured at *per foot run.*

The boarding for filling in between top and bottom rails or between seats and floor should be described as in 12-inch or 14-inch lengths, as the case may be, and what it is to be used for.

Bench ends and standards are most conveniently numbered, giving a sketch and stating the labour on each.

Ornamental framings, as stall fronts, may be measured at *per foot run*, stating thickness and height, and giving sketch and description, or the labour in a given length of it may be stated.

In all cases provide in the estimate for a pattern bench, including its carriage to and from the building.

For pulpits, lecterns, prayer desks, &c., a sum is usually provided, but where not thus treated, the quantity of material in each should be kept separate, so that the cost of the article in question may be seen without trouble.

FITTINGS.—If in large quantity, as the shelves, dressers, cupboards, &c., of a large house, should be made a separate section in the bill; it is not fair to bill them with the general joinery, as they are worth a larger price. Take them out in as much detail as possible.

## IRONMONGERY.

Where it is essential that the ironmongery should be of very good quality it is a frequent practice to specify the prime cost of each of the articles or to select a manufacturer to whom a list of the ironmongery is sent to affix his prices, the total sum being then included in the estimate as a provision, in such a case the "fixing only" appearing in the joiner's bill.

State in all cases whether ironmongery is of brass, iron, or gun-metal, and keep ironmongery and fixing to deal separate from that fixed to hard woods, with which latter include that fixed to pitch pine.

When an article of ironmongery does not appear in any trade list it must be described as "purpose made."

Iron Butts or Back Flaps.—Give the size, measuring along the knuckle, state if rising or projecting butts, if the latter, give the length and width when closed, state if with steel washers and pins, if with face plates, and if the face plates are engraved.

Cross Garnet Hinges.—State the length measured from knuckle to point.

Strap Hinges.—State length, size of iron, if with fanged or double-fanged hooks, if with screwed plates, if bolted state the size of bolts and the number to each hinge. Observe to take the labour to letting into stone and lead and running where fixed to stonework.

Patent Hinges.—Describe the kind, the thickness of the door they are for, if spring hinges, including filling boxes with neat's-foot oil, and in all cases adjusting at completion. For spring hinges take a wood cradle or oak block, and letting in where in a wooden floor, and letting into stone and running with lead where a stone floor.

Ornamental Hinges.—If cast-iron hinge-fronts they may generally be most conveniently selected from an illustrated trade catalogue, the number of the pattern and name of manufacturer being stated in the quantities. If wrought-iron ornamental hinges to design it will be better to provide a sum per pair, the fixing being either taken separately or included in the amount provided.

Bolts.—State length (measured by the length of the rod of the bolt), if tower, barrel, bright rod, necked, brass mounted, square, monkey-tailed. Number the brass or iron thimbles or floor-plates for bolts, and state whether let into wood or stone, and in the latter case whether run with lead or cement.

Flush Bolts.—State length and width.

Espagnolette Bolts.—State the height of the doors they are intended to secure.

These are measured and designated by their length in inches.

**Smith's Sill Bar.**—State length and whether to single or folding casements, and observe that they cannot be applied to a casement under 2 inches in thickness.

**Smith's Weather-tight Casement Fastenings.** — State length, and whether to single or folding casements.

**Locks.**—State the size, the kind, as iron rim, mortise, draw-back, if three bolt, two bolt, or one bolt (two bolt is the usual kind), dead or stock, if upright, if rebated or half rebated (the two latter for folding doors), the kind of furniture. In cases where a number of doors occur and each side has a different kind of furniture it will be most convenient to take the locks and furniture separate, numbering each side of the door as a half set of the furniture required, and describing the locks as "without furniture." State if locks are "en suite," and if so number the master keys.

In cases of oak stock locks, with wrought-iron mountings, to design, it will be better to provide a sum, taking the fixing separately or including the fixing in the amount provided.

Cupboard locks and upright locks are described by their height in inches; all other locks by their length in inches.

If locks are copper or brass warded, state it.

In measuring mortise locks after they are fixed, the length from the centre of the spindle to the edge of the door, plus 1 inch, will be the length of the lock.

**Finger Plates.**—Describe them and state whether long or short. Number each *one*, not each *set*—the latter term is misleading.

**Knobs.**—State diameter, and whether metal, porcelain, ebony, &c., and describe as sets or half sets of furniture.

If patent spindles state whose patent.

**Sash Fastenings.**—State length and quality.

**Sash Centres.** — Number the pairs, state length and quality; observe that a pair of sash centres is two centres and two slotted plates.

**Cups and Screws.**—Per dozen. If not specially described, take them about 15 inches apart.

Slotted Screws, each. Brass screws (state length) and brass slotted plates, including all labour for slotting on architraves or as the case may be; average 18 inches apart.

## PLUMBER.

A sheet of lead is ostensibly 7 feet by 30 feet, usually about 6 feet 10 inches wide, and of length varying from 25 feet to 30 feet. The lead for gutters and flats is cut lengthwise of the sheet, that for flashings, hips, ridges, &c., across the sheet.

If a large work, keep external and internal plumbing separate. Measure all the sheet lead by the foot superficial, and bill it by weight.

Gutters, flats, and flashings are billed together. Stepped flashings and soakers should be kept separate, as there is more trouble in fixing.

Lead to curved roofs, ornamental turrets and flêches, should be kept separate.

Measure per foot run, dressing lead to mouldings, stating girth, and number the mitres.

### EXTERNALLY.

Flats and Gutters.—Measure the lead by the foot superficial, allow in the width for turning up under slating (usually 9 inches from bottom of gutter), and against walls (usually 6 inches from bottom of gutter). Allow for 1½-inch drips 6 inches, and for 2-inch drips 8 inches; for 1½-inch rolls 6 inches, and for 2-inch rolls 8 inches. Assume always that drips are not more than 10 feet apart, as when in longer lengths there is much risk from expansion and contraction. Collect rolls and drips as much as possible.

Flashings.—5 inches to 6 inches wide usually. In these an allowance must be made for tacks and passings, add 4 inches for every 7 feet in length, and 6 inches for every angle. This will be found to be practically correct; or, allow 3 inches every 7 feet in length for passings, and take tacks 6-inch by 2-inch at distances of 3 feet 6 inches apart.

APRONS.—Usually 12 inches wide. Make the same allowance in length as for flashings.

RIDGES, HIPS, AND VALLEYS.—The two former usually 18 inches wide, the latter 20 inches wide. Allow for clips and passings as for flashings.

*Observe* that where ridges stop against a roof plane as in the case of dormers—a "soaker" must be taken about 18 inches square.

STEPPED FLASHINGS.—Usually 12 inches wide. Make the same allowance as for horizontal flashings. Where soakers are specified instead of stepped flashings, a piece of lead should be taken to each course of slates or tiles, allowing the same lap as the slates or tiles minus 1 inch, and to course with them, running 4 inches under slating or tiling, and turning up 4 inches against wall. This gives 8 inches by 9 inches for each soaker to tiles, and 8 inches by 19 inches to countess slates. Anything less makes unsound work. Take stepped flashing over about 5 inches wide generally. Bill stepped flashings separately.

Where roofs are covered with lead, forming "lean-tos" against walls, as to the aisle roofs of some churches, lead tacks, about 9 inches by 3 inches, should be taken, wedged at one end into the wall, and soldered to the lead covering, one to each bay, formed by the rolls.

*Per foot run.* Lead or oak wedging to flashings. Keep that in stepped flashings separate; in either case take the same length as that taken for the flashings. Copper nailing, state whether "open," "close" (1 inch apart), or "very close." Bedding edge of flashings in white-lead. Labour to vandyked or serrated edges. Soldered angle. Extra labour, dressing lead over fillet to form secret gutter. Welted edge. Rain-water pipe, state size of bore, weight per foot superficial of the lead used, if tacked, if collared, if fixed in chase. Where a flashing is grooved into a horizontal instead of a vertical face, take "burning in" to flashings in stonework only.

*Number.* Extra labour and solder to cesspools. Lead, iron, or copper wire covers to cesspools, or to outlets of eaves gutters. Lead heads of rain-water pipes, copper wire covers to ditto. Lengths of socket pipe, stating size of bore, length in inches, whether "once," "twice," or "all bent," and the number of soldered joints to each, and the weight per foot superficial of lead it is made from. Bossed ends to rolls. Bossed intersections to rolls. Bossed cross intersections of roll with ridge. Soldered dots and brass screws. Bossing and dressing lead to crockets, stating extreme dimensions. Sets of flashings and soldering to pipes passing through roof, giving weight per foot of the lead used, and the size of pipe, or the total weight of the set. Bossing lead out of solid over bases of finials, vanes, &c., describing each, and giving sketch. Some surveyors say "plumber and labourer, . . . hours each, as *provision*," to such an item as the foregoing, the charge for the actual time spent being adjusted at completion. Lead hood or bonnet and straps out of . . . lbs. lead to (ventilating) pipe, state size of pipe.

### INTERNALLY.

The larger proportion of the internal work will be connected with the water supply.

Before measuring the water supply it will be necessary to obtain a copy of the regulations of the water company which supplies the district, you will then be sure of the prescribed weights of pipes, regulations as to wastes, waste preventers, brasswork, &c., and in cases where the building is to be supplied by meter the surveyor should ascertain whether the proprietor will supply his own meter or hire one of the water company at a rental.

Observe generally that where a water meter is used no waste preventers will be required, though even then some of the water companies insist upon their use.

In all items relating to pipes state the bore of pipe, except to copper and brass pipes, which are described by their external diameter, and where a cock or short length of pipe requires tafted ends, soldered joints, soldered ends, or bends, include them with the article. Observe that this clause applies to many of the items under the head of "numbers."

Do not measure short lengths of pipe by the lineal foot, but number them (up to 4 feet in length), stating the length.

The weight of pipes, up to 2-inch bore, will be settled by a clause in the bill of quantities. Where of greater bore state the weight per foot superficial of the lead they are made from.

Where very good cocks or valves or apparatus are required, it is well to state in the bill the name of the manufacturer.

In a large work it will be advisable to make a complete list of the cisterns and their supplies, and the apparatus connected with each, and cross off each as it is measured. This saves time, although apparently cumbrous, thus:—

Attic Floor:

*Cisterns.*

| | | | |
|---|---|---|---|
| 1 Drinking water | waste | supply | overflow. |
| 1 Rain water | waste | | overflow. |
| 2 W.C. cisterns | waste | supply | overflow |
| — | | | |
| 1 W.C. south of bedroom 2 | | soil-pipe | supply. |
| 1 „ north of ditto 3 | | ditto | ditto. |

| | Hot Water. | Cold. | Rain Water. | Waste. |
|---|---|---|---|---|
| Housemaid's Sink, next back stairs | 1 | 1 | 1 | 1 |
| Ditto, next Bathroom .. .. .. | 1 | 1 | 1 | 1 |

&c.

Lead in Sinks, Cisterns, and Safes, *per foot superficial.*—Keep the lead in safes separate from that in sinks and cisterns, to these two latter allow 1 inch for the lap where soldered angles occur, and a width equal to the thickness to the wooden sides for turning over at the top. The soldered joint to sinks should be taken to four vertical angles and two edges of bottom, the lead of ends and bottom being usually in one piece. To cisterns. take soldered angle to all angles if large, if small, treat as directed for sinks. Take copper nailing around the outer edge of the sides and ends, both to sinks and cisterns.

*Measure at per foot run.* Soldered angle, copper nailing. Lead pipes, state whether "middling" or "strong," and include the joints in the description except the branch joints, i. e.

junctions of one pipe with a main line of pipe which are counted, and charged as "extra soldered joints." Soil pipes; state bore, what lead out of (as 7 lbs.), whether tacked, collared, fixed in chase. Copper pipes; state bore, whether perforated as for urinals. Haine's tin-encased pipe. Keep pipes laid in ground separate.

For measuring the diameter of pipes, if the necessity arise, pocket dividers may be adjusted in the form of callipers, and used in a similar manner.

*Number* branch joints to pipes.

Observe that branch joints are described by the size of the main pipe, thus a joint at the junction of a ¾-inch pipe with 1-inch pipe is called a "1-inch extra soldered joint."

Fire bends (if any), soldered ends, ends tafted and soldered. Lengths of pipe; state length, whether bent, and how many times bent, if jointed to iron, if soldered and pierced (as for dribble pipe). Trumpet-mouthed waste; state length, average bore, what lead out of, if with beaded top, whether lead or galvanized iron. Extra for bends to soil pipes, stating size of pipe and how many soldered joints to each. Bonnets or cowls to air pipes; state weight per foot of lead used and size of pipe. Lead collars and soldering to soil or waste pipes; state size of pipe and weight per foot of the lead used. Lead D traps; state if full size, what lead out of, if with brass screw cap and lining, state size of latter, state if trap is soldered to safe. Dent, and Hellyer's cast-lead traps; state size, whether with brass screw cap and lining, state size of latter. Observe that where waste pipes deliver over gratings in the open air you may safely dispense with traps. Brass screw unions; state size, and if with fly nut, and whether to iron or slate, and whether jointed to iron or lead pipe. Brass washers and wastes, all as last. Brass cistern connectors and all as last. Tee pieces to copper pipe, state size of pipe, include the brazed joints. Stopped ends to ditto. Cocks; state size, if plated, brass, or iron, stop cocks or bib cocks, round or square way, screw bottom screw boss, if with loose key or spanner, if high pressure screw-down loose valve, diaphragm, double-action; if screwed for iron, if engraved, and what, as "HOT,"

&c. Observe that air vessels are not necessary when screw-down valves are used. Ball cocks or valves; state size, and if copper or zinc ball and stem. Sets of bath valves; give full description. Copper clips, and brass screws.

In all cases, state whether brasswork is jointed to iron, lead, or slate.

Pumps.—Give description, and P.C. price if possible, or refer by number to a trade catalogue, and include joints with description; take suction pipe and rose.

Wrought-iron Cisterns.—State if galvanized, the length, width, depth in clear, or to hold water...feet deep, or if the space to receive cistern will allow of variation of size, and shape is unimportant, give the alternative, "or to hold...gallons." Where the usual trade iron cistern is all that is required, no particulars of thickness, stays, &c., need be given, but where a better kind or larger size is required state the thickness of iron, the size of angle iron around top and at angles, the size of stays if any, include the "necessary perforations" and small angle stay for ball valve or cock in the description, and state the height from the ground of the hoisting.

A system has arisen of supplying iron cisterns at ⅛ inch, or ¼ inch, or ½ inch (as the case may be), "full" or "bare" as to thickness, and as in the case where there are a number of cisterns this may make a large difference in cost, the surveyor should see that his employer obtains what is specified.

Observe that in calculating the content of cisterns 3 inches less than the absolute depth should be taken as their capacity.

W.C. Apparatus.—Provide a sum for each, and give address of manufacturer. State colour and kind of basin, size of valve; if with regulator, and what kind; if with looking-glass bottom-valve; if copper pan; the metal of sunk dish, and description of handle; include the joints and fixing in description.

Where there are a number of w.c.'s in one establishment it is a good plan to add to the description "to be set in order by manufacturer (or patentee) at completion."

Lavatory Apparatus.—It is better to provide a sum for these, or give a full description and address of maker. Include all joints and unions and fixing with the description. If the marble or slate top is not to be supplied by the manufacturer of apparatus, state in description that it is "elsewhere taken."

URINALS.—Give description as before, and include the joints and fixing.

BATHS.—State if full sized or what size, if iron, copper, porcelain. Include joints. If porcelain baths have extra inlets, state it; as these baths are very heavy state the height of hoisting, and observe that their great weight will often necessitate extra strength in the floor timbers. Take a wooden cradle for each.

WATER METERS.—Provide a sum to include fixing and joints. If outside the building take a brick cesspool and cover to enclose it.

WASTE PREVENTERS.—Give descriptions, and include joints and fixing.

## ZINCWORKER.

ZINC.—Measure at per foot superficial in the same manner and with the same allowances, as for lead, except that the sheets being only 7 feet and 8 feet in length and 2 feet 8 inches and 3 feet wide, more drips will be required. State the gauge, and whether English or "Vieille Montagne," or as may be.

If the zinc is corrugated, state it, and measure as if plain, making no allowance for the corrugating. State how it has been measured, and the way the sheets are connected.

The zincworker usually charges his work at a price per foot superficial, including everything except soldered shields to ends of rolls; these should be numbered.

Observe that the "rolls" should be described (in the carpenter's bill) as twice splayed fillets, stating the size.

Measure gutters and rain-water pipes by the foot run, stating the size and out of what gauge zinc.

*Number* the angles, outlets, &c., to gutter, and the heads, shoes, bends, &c., to the rain-water pipes.

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## PLASTERER.

Keep external work separate from internal work.

Measure plastering generally by the yard superficial. In all work, except cement and stucco work, narrow widths may be included with the general work. Measure walls and partitions from top of skirting grounds to ceiling where not plastered down to floor; where they are, measure from floor to ceiling.

Where plastering is on old walls, take "hacking off old plastering, and raking out joints to form key" for new, and where the surface is likely to be very uneven, say in the description, "allow for any necessary dubbing with tiles and cement."

If part is on old, and part on new walls, the dubbing must be separately measured.

If it is at any time necessary to produce a face more than 1¼ inch beyond the face of brickwork, add to the description the words "and dubbing out with tiles and cement."

If any plastering is to be more than 1 inch thick it must be stated.

Keep circular plastering separate from straight.

Keep plastering in small quantities separate from the rest, and measure by the foot superficial instead of by the yard.

If any plastering is finished in gauged stuff it must be stated in the description, and say what it is gauged with and proportions of the material.

Deduct openings clear of the grounds, or clear of the openings where there are no grounds.

Make no deductions for chimneypieces, as the quantity not deducted is considered equivalent to the making good; or deduct plastering, and add . . . making good to chimneypieces.

The case of plastering to specially high stories may be met by a clause in the preliminary bill, which see.

When cement work, as in reveals, &c., is stopped against *stone*, terra-cotta, or brick facings, state it.

PUGGING, *per yard superficial.*—State the thickness and of what composed. Measure the whole surface, including the space occupied by joists, and state that the joists are not deducted.

Counterlathing and fillets and twice rough rendering to partitions, *per yard superficial.*

PLASTERING TO WALLS, *at per yard superficial.*—State if render, render and set, or render, float and set.

PLASTERING TO PARTITIONS, *at per yard superficial.*—State if *lath, plaster and set*, or *lath, plaster, float and set*, if "lath and half" or "double laths." The foregoing descriptions in italics will be sufficient when the lathing is of the common thickness. Deductions as to walls.

PLASTERING TO CEILINGS AND SOFFITS, *at per yard superficial.*—As described for partitions, but state that it is to ceiling and soffits. Keep sloping ceilings separate. If between rafters state it; measure the rafters in, and state that they are not deducted. If in panels, describe as "in panels not exceeding . . . yards each." Keep flueing soffits separate. The whitening will be measured with the plastering, but separate in the bill. The theory is to deduct from the ceiling the projection of cornice at one side and end, but this is rarely done unless the cornice is unusually large (24 inches girth).

STUCCO, *per yard superficial.*—State if "render, float and finish, trowelled or bastard stucco for paint," or "lath, plaster, float and finish, trowelled or bastard stucco for paint." State if floated with a felt float. If circular, if in narrow widths or small quantities, measure at per foot superficial.

*Measure at per foot run.*—Reveals not exceeding 9 inches wide. Where with an arris, describe both together as arris and . . . inch return, . . . arris, beads, chamfers of the two latter, stating girth or width.

INCISED PLASTERING, *per yard superficial*, or a price per yard should be provided. Give a sketch to show the kind of work. If in panels number them, giving the size and a sketch.

CORNICES.—Where not exceeding 12 inches in girth by *the foot run*, where exceeding 12 inches in girth by the foot super-

*ficial.* If the cornices do not exceed 12 inches in girth the length of the walls will be sufficiently near for the length of the cornice; where they exceed 12 inches in girth the mean length must be taken.

Where cornices are bracketed keep them separate, and state that they are "on lath."

Where cornices are enriched measure the whole girth of the cornice, including the space which will be occupied by the enrichment, as moulded work.

Coves, in cases, where they are not run in the same process which produces the cornice, should be measured per foot superficial, and described as coves; otherwise measure and describe them as cornices.

It is customary where the girth of a cornice is measured from the mould used to run it, to allow 1 inch beyond the actual girth on the mould. Make the same allowance when measuring from a detail drawing. This allowance is to cover the expense of running a screed on the ceiling. See also preamble to plasterer's bill, p. 155. In the absence of details it will be reasonable to assume that the height of the wall and width of ceiling covered by cornice added together equal three-quarters of girth, that one-third of this is on wall and two-thirds on ceiling.

It is not usual to make any distinction for short lengths of cornice, where of the usual character, as to returns of chimney breasts, but where from the nature of the work there are many, anything under 18 inches in length should be described as in short lengths, and kept separate.

*Number all* the mitres, irregular mitres, stopped ends, stopped ends on splay, returned and mitred ends, stating girth of cornice, circular corners, stating girth of corner and cornice.

ENRICHMENTS, *per foot run.*—State the girth, and whether to design.

*Number* the mitres, and state whether specially modelled.

Stopped ends, &c., as to cornices.

In all cases of enrichments state that modelling is to be included.

Moulded ceiling ribs, *per foot run.*—State girth and that they are to include cutting to form key and making good after. If net girth state it. If not, add to girth 2 inches for screeds.

*Number* the mitres, stopped ends, &c. It will be found most convenient where ribs intersect to count and describe the mitres as "half-mitres."

In the case of ceilings with ribs, an item should appear in the bill something like the following:—"Allow for setting-out ceiling 29 feet × 21 feet ('to irregular plan,' if irregular) in geometrical panels to detail."

*Generally at per foot run.*—Plaster quirk. Making good plastering to slate shelves, &c.

*Generally number*, making good plastering to ends of bearers, cantilevers, handrails, &c., and to those things which have been fixed after plastering was done.

Modillions, pateræ, caps to columns or pilasters, stating size and giving full description and sketch, and state that they include modelling.

PORTLAND CEMENT, *per yard superficial.*—Measure as for other plastering. State whether "rendered," plain-face, render and float, or trowelled, and whether on brick or lath. Describe anything under 2 feet wide as in narrow widths.

Measure all arrises, rustic grooves, &c., and mouldings up to 12-inch girth, at per foot run.

Measure mouldings over 12 inches girth at per foot superficial.

Mouldings, arrises, &c., not exceeding 18 inches long should be described as in short lengths and kept separate.

If mouldings are flush, state it.

*Observe* that all cement work forming plain faces between rustic grooves must be described as in narrow widths.

MARTIN'S, KEEN'S, OR PARIAN CEMENT.—Measure as other cement work. State whether on backings of coarse cement of the same kind or on backings of Portland cement.

*Generally per foot run.* Skirtings, state height and whether square, flush, beaded, chamfered, or moulded. If dubbed out, state how much projection.

Angle, state if with one or two returns, and the width of the returns.

Angle beads, and state if with one or two quirks. Chamfered angles, state width. Splays, state width and that they include two arrises, and describe returns if any.

*Generally numbers.* Mitres to skirtings, splays, mouldings, &c. Stopped ends and mitres to splays, junctions of circular and straight splays, &c. In all cases state girth or width.

WHITENING AND COLOURING, *per yard superficial.*—State if claircolled, if stippled, whether once or twice whitened or coloured, and whether on plastering or brick. Measure the foregoing with the plastering on which it is done.

DISTEMPERING TO CORNICES, *per foot run*, measured with the cornices.—State whether once or twice, whether in one or more tints, and the girth of the cornice.

## FOUNDER AND SMITH.

Keep wrought and cast work separate.

In all cases of heavy work measure the superficial quantity of iron and state the thickness in the dimensions, so as to obtain the weight.

For girders, columns, stanchions, and heavy pieces of ironwork generally, state the height of hoisting and what trades they are fixed by.

Keep the different kinds of articles separate, and in addition to the weight state what the weight comprises, as, so many columns or stanchions of such a height.

Take a pattern to every variety of casting and an alteration to pattern where the pattern is altered, as in the instance of the shortening of a column.

If artistic wrought ironwork of high finish is required, a sum should be *provided* in the quantities founded on an estimate from an ironworker to be selected.

In measuring labours on iron, be careful to state if any of the work is to iron in position, as for instance "No. . . . rivets $\frac{5}{8}$-inch diameter and including holes through one thickness of $\frac{1}{4}$-inch and of $\frac{3}{8}$-inch iron *in position.*"

EAVES GUTTERS, *per foot run.*—The most frequent practice is to measure by the yard, any dimension less than 3 feet being called a yard. Some surveyors measure the exact length, but if this is done it should be described as "measured net." State size, if jointed in red lead, if bolted at joints, if screwed to fascia or rafter's feet, if bedded on brickwork and blocked up to falls. Describe the brackets or clips if of unusual pattern.

If it be desired to adopt a gutter of any particular manufacture, state the name of manufacturer, and the number in their trade catalogue. State if "heavy."

*Number.* The angles, outlets, stopped ends, returned and mitred ends. The brackets, if of wrought iron, stating the weight, and if ornamental Give a sketch, and state how they are fixed, or trade catalogue may be referred to.

RAIN-WATER PIPES, *per foot run.*—Measure in the same way as described for eaves gutters. Where a manufacturer is selected, give the number in trade catalogue as described for eaves gutter. State size, if "heavy," whether round or square, if set up in red lead or iron cement, if joints are plugged with tow, if with ears cast on, if nailed with rose head or ornamental nails, if with oak or teak plugs in the brick or stone work. If with ornamental bands give price each, or state number in trade catalogue, and keep them separate from the pipe.

*Number* shoes, plinth bends (state projection), swan necks (state projection), heads, if ornamental, giving price or number in trade catalogue, Y pieces. State in all cases the size of pipe.

If either of the foregoing require to be purpose made state it, and that it is to include pattern.

KING OR QUEEN HEADS, *number.*—Give weight of each. State that it is to include pattern.

COAL PLATES, *number.*—State diameter, whether plain or illuminating, and include wrought-iron hook, chain, staple, and padlock, and protecting ring if any.

PAVEMENT LIGHTS, *number.*—State size, if illuminating, state how glazed, if prismatic, if with round or square lenses, if with irregular angles or irregular shaped.

If patent, give address of manufacturer and number in trade catalogue.

Chimney and Bearing Bars, *at per foot run*, billed *at per cwt.*—Generally measured about 2 feet longer than opening, and ½ inch by 2½ inches. State size, and if cambered and caulked, and add to description "and fixing by bricklayer."

Flitch Plates, *at per foot superficial*, billed *at per cwt.*—In addition to the weight, state thickness and length. The height of hoisting. That it includes perforations, or the perforations may be taken separately, stating their diameter and the thickness of the iron.

Straps and Bolts, *at per foot run*, billed *at per cwt.*—Describe as "bolts and straps, including perforations." Only bolts over 24 inches long should be included with the foregoing. Some surveyors allow in the measurement six times the diameter of the bolt for the head and nut, but it is better to make an item "extra for large head nut and washer to 1¼-inch bolt," or as the case may be."

Saddle Bars, *per foot run.*—State also the total weight in bill. State if round or square, the size of section, and if galvanized. Rings of saddle-bar are best numbered, stating the number of points to each.

When a provision is made for stained glass those windows in which it occurs may be omitted from the measurement of saddle-bars; the persons who supply the glass prefer to supply them also.

Hoop Iron.—See Bricklayer.

Rolled Joists in small or medium sizes, up to 9 inches deep, *at per foot run*, billed *at per cwt.*—State if to exact lengths, if they are hoisted to various heights. State the weight in lbs. per foot run. If over 30 feet long, state it and keep them separate.

Large Rolled Joists, *per foot run*, billed *at per cwt.*—State the number of joists comprised in the weight, and the height of hoisting.

Riveted Girders, measure the iron *per foot superficial*, stating thickness of iron, bill *at per cwt.*—Add 5 per cent. of the total weight in abstract for the weight of rivets of the usual distance apart ("4-inch pitch").

Five per cent. is the usual allowance, but in deep lattice girders $2\frac{1}{2}$ per cent. is sometimes sufficient.

AREA GRATINGS, the bars and rails *at per foot run*, stating size, billed *at per cwt.*—Describe them as *framed.* "Framed" implies all the necessary perforations, riveting, &c.

GUARD BARS, *at per foot run*, billed *at per cwt.*—As for area gratings. Number the forged ends (generally pointed), stating the size of bar.

BALUSTERS, *at per foot run*, stating size and whether round or square, billed *at per cwt.* Describe as "framed balusters."

*Numbers.* Holes rimed out at bolt holes (this only occurs in cast work). Perforations, state diameter and the thickness of iron. Forged ends, state size of bar. Sets of ornamental heads, nuts, and washers to bolts, stating diameter of bolt. This item to bolts already measured at per foot run, and no allowance having been made for their weight. Bolts up to 24 inches long averaged, keeping separate those not exceeding and exceeding 12 inches long, and keeping the various diameters separate; state if with ornamental heads, nuts, and washers.

Ends of joists cut, fitted, and connected with cross-joists, such an item as follows is common. "No. . . . ends of iron joists $2\frac{1}{4}$ inches by 7 inches cut and fitted to iron and riveted with 6-inch length of 4-inch by 4-inch angle iron to web of joist of similar section."

Bolts should be measured from the inside of head to the point of the screw.

FELT PADS.—State size and kind of felt.

RIVETS.—State diameter, how many thicknesses of iron they pass through, and that they include holes, and as these are separately measured only when the work is "in position," state it.

CAST-IRON GRATINGS OR PANELS.—State size and thickness, or refer to a number in a trade book.

HANDRAILS, *at per foot run*, billed *at per cwt.*—In bill, state length, size, and section, as well as weight; describe as framed. Keep the ramped or wreathed parts separate, but treat in the same manner. Number the scrolls as "extra labour," the iron being measured in with the straight rail.

## GASFITTER.

Frequently the whole of the gasfitting is put into the bill "as provision" of . . . feet of the various sizes of pipe.

State the quality of the tubing ("iron barrel") and whether the price is to include tees, elbows, connections, bends, &c., and whether the joints are set up in red-lead cement. Also whether it includes attendances and fixing floor boards and joinery with brass cups and screws to remove.

State that the gasfitting is to be executed to the satisfaction of the company's inspector.

PIPING, *per foot run*, giving size.

*Number generally.* Brackets or pendants, usually P.C. so much each. Gas meter, stating whether wet or dry, and the number of lights, and include stamping by company's inspector, and for carriage.

Count the number of proposed lights and provide a meter equal to about $\frac{5}{8}$ of the number. Thus 100 lights should have a 60-light meter. Reference to a price book will show you the capacity of the stock gas meter.

The meter is generally hired from the company at an annual rental, in such case it will not appear in the quantities.

Tees, elbows, diminishing sockets, screw caps, &c., if not included in general description of piping, but they are usually.

Length of lead pipe and connection with main and meter.

Gas main cock, stating size and that it is jointed to iron pipe. The perforations for pipe and making good, stating the thickness of walls (afterwards averaged).

## BELLHANGER.

Count the number of bells and the number of pulls. Describe the carriages. State weight of bells (average each), if with pendulums and indicators, the gauge of the copper wire, if in concealed zinc or copper tubes, with brass cranks, steel springs, and brass tee plates, and if the lever pulls are fixed with iron boxes and mouth-pieces.

Provide a sum for the pulls.

Number the bell boards. State thickness, if moulded or beaded, and for how many bells. If numbers are printed below bells (instead of indicators) measure the writing in inches, and state if plain or ornamental writing, or number the figures, stating their height.

In cases of electric or pneumatic bells it will be most convenient to obtain an estimate from a manufacturer, and to provide a sum in the estimate.

State in an item that the carpenter and joiner are to attend upon, cut away for, and make good after bell-hanger to so many bells with so many pulls (and to include the boards for bell runners, &c., and fixing the floor boards with brass cups and screws to remove).

A similar item for bricklayer's attendance, omitting the words of the foregoing paragraph which are in parenthesis.

A similar item for mason's attendance, if any is required.

SPEAKING TUBES, *at per foot run.*—Assume that the mouth-pieces are placed about 4 feet 9 inches from floor. The pipe and fittings vary so much that it is better to obtain an estimate from a selected manufacturer, and provide a sum founded upon his estimate. Attendances may be included in the sum provided, or may be described in the bill, stating the number of feet run.

## GLAZIER.

The surveyor in measuring should observe where glass should be ground, as in borrowed lights, w.c. windows, &c., and he should call the attention of the architect to dark corridors or rooms where there are no windows, when the inadvertence can be obviated by glazing door panels or the introduction of windows.

All glass should be measured per foot superficial, the extreme dimensions being measured, whether square, circular, or irregular shape; any part of an inch is called an inch in measuring.

Measure the whole of the glass in each opening in a single dimension where possible.

If openings are square, and the joinery common sashes and frames, the quantity of glass would be very nearly as follows:—The size of the external openings, minus 2 inches of the width and 6 inches of the height.

In all cases state if glazed in indiarubber or washleather.

The practice is now almost uniform of describing glass as cut to shapes, instead of measuring the circular cutting and risk by the lineal foot.

The term "not exceeding....feet" is better than "under ....feet."

SHEET GLASS.—No distinction need be made between sizes not exceeding 2 feet superficial. Keep separate the various sizes above 2 feet, 4 feet, 6 feet, &c. State the number of ounces per foot superficial, as 15 oz., 21 oz., 26 oz. Keep panes of irregular shape separate, and describe them as "cut to shapes"; keep separate, glass over 42 inches long and describe length; state if ground on one or both sides; if "matted"; if coloured, stating what colour.

PLATE GLASS.—State thickness and quality, and the superficial quantity in a square, commencing with not exceeding 2 feet superficial, and keeping each size separate, as follows, 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 18, 20, 25, 30 feet, &c. State if cut to shapes, or bent, or ground, and keep separate. Observe that British polished plate is polished down to *about* $\frac{1}{4}$-inch out of $\frac{3}{8}$-inch, but it is of a mere average thickness. Exact thickness must be paid an extra price for, as it must be gauged, and must be billed separately and so described.

*Measure at per foot superficial.* Embossing or enamelling, and state the prime cost per foot superficial. Observe that embossers charge the whole square, although part only may be embossed. Bending, state superficial content, kind of glass, and radius of curve. Silvering, and observe to take flannel and wood to back of it.

LEAD LIGHTS, *per foot superficial.*—It will usually be sufficient to allow half an inch around the light to be glazed beyond the clear width between the mullions or tracery, but reckon all fractional parts of inches as inches; describe the lead, if in quarries, if bordered, the description of glass, if the lights are secured with copper wire or copper bands. Keep the parts in cusped or pointed heads, or in tracery, separate, measuring to the extreme points, and stating that it is measured square.

Some of the lead light manufacturers charge lights *under* 12 inches wide as 12 inches wide.

State if lead lights have to be put in from the outside of building. Sometimes required in old buildings where the stanchions are inside the windows, and their removal is inexpedient.

Where the glazing is ornamental, and the quarries are painted or enamelled, it is better to obtain an estimate from a glass painter to be selected, and either include the total sum as a provision, or describe as P.C. 3*s*. per foot, or as the case may be.

*Number.* Copper clips and brass screws to skylights. Engraved corners, stating size and colour and the kind of glass.

Iron casements; giving description, or provide so much each, and refer to trade list, and include packing, carriage, and fixing, and state the number of mortises in stone or wood, and lead and running if in the former.

NOTE.—In case of dispute as to the description of glass, look for bubbles in its substance; if in sheet glass they are oval, if in plate glass spherical. Where glass is supposed to be crown, look to the edges of the squares, when careful examination will probably show you faint concentric waves.

## PAPERHANGER.

This trade may generally be measured with the plastering.

Measure the superficial area of the parts of the walls papered, and deduct as for plastering. The quantity may be obtained from the dimensions of that trade. The usual *practice* is to allow one piece in seven for waste, and as a piece of paper should equal 63 feet superficial, i. e. 12 yards long, 21 inches wide, the total superficial quantity in feet divided by 54 should give quantity required. But a piece of paper rarely exceeds 11 yards in length = 58 feet superficial, it is therefore fairer to use 50 feet as a divisor. Reckon any part of a piece as a whole piece. If any part is on ceilings keep it separate.

French papers are 18 inches wide and rarely exceed 9 yards in length, = 40 feet 6 inches superficial. a deduction of ⅐th gives a divisor of about 35 feet.

The sizing and the general preparation of the walls may be charged as "extra for" at per piece, or may be included in the preamble of the bill.

State the P.C. per piece, if hung in blocks, if lined out.

In the case of ornamental papering, Lincrusta-Walton, or Japanese paper, measure the net surface covered with each kind, as before described, and the borders at per dozen yards run. As these vary in width and length, surveyor must obtain particulars before he reduces them.

*Number.* The pieces of paper sized and varnished, describe the varnish, and state how many times varnished.

In all cases include the hanging with the description.

CANVAS AND BATTENS, *at per yard superficial.* State size of battens, their distance apart, and whether they are plugged.

## PAINTER.

If the painting on ironwork provided is not included in the amount of provision, observe that it is often painted two oils before it is supplied.

In taking off the painting from the dimensions, the surveyor has another opportunity of checking the work, and if he is watchful will probably find errors or discrepancies.

Painting is measured in various ways, either of which will produce similar results. In deciding which plan to adopt, it is well to bear in mind the manner in which it will affect the convenience of possible variations.

Some of the methods are as follows:—

1st. Abstracting the quantity directly from the bills and adding a proportion (usually one-seventh) for edges.

2nd. Abstracting directly from the dimensions into two columns of the abstract to one of which one-seventh is added as before, the other column being for work upon which no allowance is required, i. e. where no edges are exposed. With this method it is well to put against the original dimension, in the description column, the kind of painting which has been taken, thus: as—

④ = four oils, ④ and varnish, = four oils and varnish, &c.

3rd. (and best). Look through the dimensions from the beginning (after they are squared), and repeat the dimensions of the squaring column, multiplying by a figure, according to the kind of work, as 1 foot for plain where no edges, 1 foot 2 inches where there are edges, 1 foot 3 inches where square framed or moulded. Put opposite each dimension the number of the column of the original dimensions from which it has been taken.

If this course be adopted the painting to the sash and frame and squares had better be taken at the same time as the joinery is measured, as one sometimes finds a difficulty (the drawings having been sent home perhaps) in determining the number of squares in a sash.

State if knotted, primed, stopped, and how many oils (the priming coat counting for one oil), if in extra colours, if in party colours, whether on iron, wood, brick, or cement, and keep each kind separate.

Measure at per yard superficial all work except that hereafter named. If painting on iron (say four oils) is specified to be "two oils before, and two oils after fixing," it should be kept separate.

*Per foot run.* Shelf edge, skylight bar, and rail measuring each side. Rail and bar. Include in this description such things as balusters, and things of an approximate size. Skirting. Include in this description anything of similar size which is cut in both edges. Eaves gutter. Describe as "in and out." Rain-water pipe, and state if heated and coated inside with tar. Iron railing, stating the height, whether ornamental or plain; it is more convenient, when a price per foot run is provided for railing, to make the provision include the painting. Bar heated and dipped in oil. Roof timbers, giving average size.

*Number.* Coal plates and chains. Air bricks. Gratings and frames. State if one or both sides. Rain-water pipe heads, in and out. Bolt heads. Hinges. Latches, &c., blacked. Touching up vanes or finials. Squares per dozen (counting two for one to allow for the two sides), where over 2 feet superficial call them large squares, where sashes are in one square describe them as "sheets" (counting two for one), where over 8 feet superficial call them "large," where over 13 feet, "extra large." Window frames (counting two for one to allow for the two sides) over 24 feet superficial describe as "large frames," over 36 feet superficial as "extra large frames."

OILING AND RUBBING, *at per foot superficial.*—State how many times oiled and on what wood.

STAINING, SIZING, AND VARNISHING, *at per yard superficial.*—Describe the stain. State if oil stain. Describe the varnish and how many times varnished.

FRENCH POLISHING, *per foot superficial.*—Handrails per foot run, and if to be covered with holland or paper state it.

WRITING, *per inch lineal.*—Thus twelve letters 1½ inch high equal 18 inches of writing, or they may be numbered, stating the height. State if plain and if ornamental, what kind and the colour, and if shaded.

VARNISHING, *per yard superficial.*—State if "on natural wood" or on painted work.

GRAINING AND VARNISHING, *per yard superficial.*—Measure as for plain painting, and describe as "extra for." State if combed, if grained and over grained, and describe the wood intended to be imitated, if varnished once or twice, and describe the varnish.

FLATTING.—Measure as for plain painting and describe as "extra for."

If decoration is a separate contract, the taking off and refixing of ironmongery is best done by general contractor.

### USE AND WASTE.

Shoring and poling and planking, where not provided for by a clause in the bill, should be measured and charged as "use and waste."

Measure shoring at per foot cube, and charge in a similar manner. Number the sets of wedges, describe size and whether oak or fir. Measure the planking at per foot superficial, the poling at per foot run. Measure the ironwork as described in section "Founder and Smith."

### VENTILATION AND WARMING.

This work is generally a provision, but the surveyor should see the engineer to whom it is to be entrusted, and make inquiry as to the requisite constructive arrangements, so that he may provide for them in the quantities by measuring all but apparatus in the usual way.

The attendance upon the engineer is most fairly met by the provision of such a sum as the surveyor may think will cover the work, the exact amount to be adjusted at completion in day account.

### CREDITS.

Where an old building is to be pulled down to make room for a new one there are several courses open to the architect. Where none of the old materials are to be used in the new building it is better either to sell them as they stand to a dealer in old building materials (this is often arranged by tender), or, if too large for one man to deal with, and worth the expenditure for an auctioneer's charges, they are sold at auction in lots; in either case the purchase involving pulling down and clearing away rubbish by the purchaser, as also any necessary shoring by him to adjoining buildings.

Observe that the purchaser will usually only pull down to ground level, unless an express stipulation is made to the contrary.

The other way is to arrange that the old materials shall be the contractor's property, and in such a case a bill of credits should be prepared. It is obvious that the measurement of old materials to produce a bill of credits should be conducted in a different manner to that of new material, as old buildings frequently hardly pay for pulling down. The most valuable material is usually lead. Where there is to be no clerk of works, the exact weight should be as nearly as possible arrived at by careful measurement. It is always best to assume for your bill that the lead weighs 1 lb. per foot superficial less than the original weight. Where it is intended to have a clerk of works it is better to measure the lead sufficiently carefully to obtain a near approximation for the purpose of the tender, and by a clause in the bill state that the lead will be weighed as it comes from the roofs, and that the contractor is to state in his tender how much per cwt. he will allow for it, after deducting the expense of weighing, the exact quantity being adjusted at the settlement of the accounts. Some surveyors weight the whole at 4 lbs. per foot superficial, and state it in a clause of the bill. The allowance for waste on old lead is 4 lbs. per cwt. In the case where only parts of a building are to be removed, the items must be measured and enumerated.

A few examples of the method of procedure are as follows:—brickwork may be measured at per rod superficial; roofing may be described as so many squares of slating and boarding and roof timbers; flooring as so many squares of flooring and joists.

Quarter Partitions.—As so many squares.

Other items in some such condensed form as the following:—"One set of sashes and frames to opening 4 feet by 6 feet 6 inches, with linings and finishings, York sill, &c."

"One four-panel square door 2 feet 9 inches by 6 feet 6 inches, with linings and finishings." In all cases state the position of the material in the old building.

"Remove and credit roof of present third floor, about 32 feet by 56 feet, comprising 5 roof trusses, 6 dormer windows, 7 skylights, 13 squares of slating and boarding and rafters, and about 45 cwts. of lead."

Where the whole of a small building is to be removed its position and general description will be sufficient without measuring.

Where any of the old materials are to be re-used, and their use is dependent upon the decision of the architect, they should be stacked in such a manner that they may be conveniently examined, and the rejected parts carted away, and such parts as are left measured and valued by the surveyor and charged to the builder.

Where old bricks are intended to be re-used and a quantity are stacked, a proportion of which are likely to be rejected, it is better to take down a cubic yard of them from the stack and settle upon a certain proportion per yard which may be used, and such proportion may be charged to the builder as before.

See also the section on "Billing," page 138.

The foregoing pages will give a general idea of the principal methods of measurement, and prove some guide as to the way to deal with analogous cases, but in the course of practice there will arise many points which only a thorough knowledge of construction and mature experience will enable the surveyor to treat. He will not unfrequently meet with arches without abutment; girders, joists, and beams inadequate to the support of the proposed weight; roof-trusses which would inevitably thrust out the walls they were intended to rest upon; walls apparently standing upon nothing; suggestions of impossible jointing of stonework; all of which anomalies as a building expert it will be his duty to rectify.

The surveyor should also be able to judge of the possibility of working particular materials in the manner specified, and, if necessary, suggest the substitution of others.

Although in the erection of a building a division of responsibility is as much as possible to be avoided, yet it should be remembered that where there is a large quantity of work for which a builder would necessarily obtain a sub-contract, as ironwork or glass, it will sometimes produce a considerable saving to obtain separate tenders for it, and the bills of quantities must be arranged with that view.

## ABBREVIATIONS.

As a general rule it is best to avoid abbreviations, except those which are universally understood and used; these are as follows. They may be used in dimensions and abstracts, but not in bills:—

**GENERAL—**

| | |
|---|---|
| Ct. | Cement. |
| Cir. | Circular. |
| Ddt. | Deduct. |
| E. T. | Elsewhere taken. |
| E. O. | Extra only. |
| Irreg. | Irregular. |
| Mo. | Moulded. |
| N. W. | Narrow widths. |
| P. M. | Purpose made. |
| P. C. | Prime cost. |
| Ro. | Rough. |
| S. L. | Short lengths. |
| 1ce. | Once. |
| 2ce. | Twice. |
| 3ce. | Thrice. |
| L | Angle. |
| (¾) | ¾" diameter. |

**EXCAVATOR—**

| | |
|---|---|
| P. F. I. & R. | Part filled in and rammed. |

**BRICKLAYER—**

| | |
|---|---|
| B. | Brick. |
| B. & P. | Bed and point. |
| B. M. | Birdsmouth (R. C. B. M. or F. C. B .M.). |
| Co. | Course. |
| C. & P. | Cut and pin. |
| Chy. | Chimney. |
| D. P. C. | Damp proof course. |
| E. O. C. | Extra only in cement. |

| | |
|---|---|
| F. C. | Fair cutting. |
| Foots. | Footings. |
| Gd. arch | Gauged arch. |
| H. I. B. | Hoop-iron bond. |
| Ptd. arch | Pointed arch. |
| Relg. A. | Relieving arch. |
| R. C. | Rough cutting. |
| P. & C. | Parget and core. |
| Segl. A. | Segmental arch. |
| S. Q. | Squint quoins (R. C. S. Q. or F. C. S. Q.). |
| S. B. C. | Skewback cutting. |

**MASON—**

| | |
|---|---|
| B. & J. | Beds and joints. |
| Cir. F. | Circular face. |
| Mo. F. | Moulded face. |
| P. F. | Plain face. |
| R. S. | Rough sunk face. |
| S. F. | Sunk face. |

**CARPENTER AND JOINER—**

| | |
|---|---|
| B. S | Both sides. |
| B. F. | Bead flush. |
| B. B. | Bead butt. |
| Centg. | Centering. |
| D. C. F. | Deal cased frames. |
| D. H. | Double hung. |
| F. E. S. | Feather-edged springer. |
| Fd. | Framed. |
| F. S | Flat sweep. |
| H. B. S. | Herring-bone strutting. |
| I. W. | Iron weights. |
| O. S. & W. Sills | Oak sunk and weathered sills. |
| O. S. | One side. |
| O. G. | Ogee. |
| Q. S. | Quick sweep. |
| Rebd. | Rebated. |
| Sqr. | Square. |
| S. H. | Single hung. |
| Wrot. | Wrought. |
| W. B. | Wood brick. |

**PLASTERER—**

| | |
|---|---|
| Ct. | Cement. |
| L. & P. | Lath and plaster. |

| | |
|---|---|
| L. P. & S. | Lath, plaster and set. |
| L. P. F. & S. | Lath, plaster, float and set. |
| L. W. | Lime white. |
| P. Md. C. | Plaster moulded cornice. |
| P. P. C. | Plain plaster cornice. |
| R. | Render. |
| R. & S. | Render and set. |
| R. F. & S. | Render, float and set. |
| Wh. | Whiten. |
| Wattg. | Wattering. |

**FOUNDER AND SMITH—**

| | |
|---|---|
| C. I. | Cast iron. |
| R. W. P. | Rain-water pipe. |
| W. I. | Wrought iron. |

**PLUMBER—**

| | |
|---|---|
| H. P. | High pressure. |
| T. M. | Trumpet mouthed. |

**PAINTER—**

| | |
|---|---|
| F. | Flat. |
| G. | Grain. |
| K. | Knot. |
| 2 O. or ② | Two oils. |
| P. | Prime. |
| S. | Stop. |
| V. | Varnish. |

**GLAZIER—**

| | |
|---|---|
| B. P. P. | British polished plate.

# CHAPTER IV.

## SQUARING THE DIMENSIONS, ABSTRACTING, AND BILLING.

AFTER the dimensions are taken off, they should be squared ready for abstracting. They should be squared by one person, who should put his figures in the squaring column in black ink. They should be checked by another person, who should tick every dimension correctly squared with red ink, and where the calculation is wrong, make the alteration in red ink. This is a better plan than for the first man to square in pencil, and the second to ink in the dimensions. The result of squaring in ink is greater carefulness. Do not neglect to check the corrections.

Areas of circles and semicircles will be obtained from the published tables without calculation. 'Laxton's Price Book' contains these.

There are various short ways of squaring dimensions; at the risk of appearing prolix a few well-known instances may be mentioned:—

15′ × 4″ × 3″ = 1′ 3″ cube.
15′ × 6″ × 2″ = 1′ 3″ „
Dividing by 12 gives the same result in each case.
12′ × 4½″ × 3″ = 1′ 1″ 6‴ Dividing by 8 and multiplying the result by 9 is equivalent.
Analogous cases will frequently be discovered by an observant person.

The working may often be cleared of fractions by multiplying the "times" into one of the dimensions instead of into the total.

The student as he becomes familiar with dimensions will discover many labour-saving expedients; one is varying the order of his factors thus:—

8/16 0
3
2½ = 6′ 8″

3″ × 8 = 2 ft., 2½″ × 2 ft. = 5, 16′ 0″ × 5″ = 6′ 8″, a cumbrous *expression of a rapid mental process.*

The person who is squaring should look for instances of dimensions omitted, he will sometimes find work which is ostensibly measured by the foot cube with only two dimensions, thus, $\begin{array}{c}5\ \ 0\\ \underline{4\ \ 0}\end{array}$; superficial dimensions with only one, thus, $\underline{5\ \ 0}$; he should call the attention of the "taker off" to such as these.

Carry the result of *every* item into the squaring columns. The practice of neglecting to do so in the case of "numbers" is frequent, and is a fruitful source of error.

## ABSTRACTING.

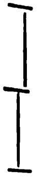
In abstracting, an unchanging order of procedure is as important as in "taking off."

The usual practice is to abstract one trade at a time, and this, taking into consideration the pressure which is commonly put upon the surveyor, is the most convenient course; but there is an additional element of safety if the abstracter can commence abstracting at the beginning of the dimensions, and proceed with the dimensions *seriatim*, irrespective of distinction of trade. If there is any error in the "taking off" he is, by following this course, much more likely to discover it.

If this cannot be done, not more than one person should be employed to abstract one trade, nor more than one person to check it.

The abstracter should adopt one unvarying practice. First, write the dimension in the column of the abstract, then cross it out on the dimensions. Let each line show clearly its beginning and end, thus, Fig. 19.

FIG. 19.

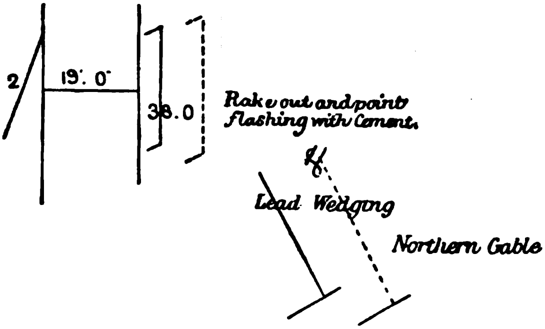


This will be a guide to each distinct process. Where there are two or more processes to one item of dimensions, requiring two or more lines, put the lines in the squaring column last, thus, Fig. 20.

N.B.—The dotted lines indicate red ink.

At the bottom of every column, as soon as the *abstracting* of that column is complete, the abstracter should put a tick in black ink. When the trades are each abstracted by a different clerk, much time will be saved in this way, for instead of looking down every column of dimensions to see if all is abstracted, a glance at the bottom of the column will be all that will be necessary.

Fig. 20.



When there are several items to one dimension, it will be a good practice to abstract them in the order in which the builder does them.

The clerk who checks should first read the item on the dimensions; secondly, find it on the abstract and tick it in red; thirdly, cross out the dimensions in red. If he does not always proceed in one order he will find himself not unfrequently uncertain whether he has crossed out the item or not, as dimensions frequently recur. When the checker cannot find a dimension in its proper place in the abstract he should write it in red at the bottom of its proper column, when he has checked the whole sheet of abstract he will probably find the item in another column without a tick, he can then cross it out. When every dimension of a column is checked he should put a tick in red at the bottom of the column.

The tendency of the inexperienced abstracter is to use too little paper, and he will frequently find, when perhaps not more than half-way through the set of dimensions, that he has no room for any fresh items without using supplementary sheets.

In the early part of his practice he should use plenty of paper.

The trouble of abstracting may be much reduced by taking advantage of the folding of the paper which is in the middle of each sheet, so that two frequently recurring items, although separated by a number of other items, may, by a mere turning over of a half of the paper, be consecutively abstracted.

It is the practice of some surveyors to put opposite to each dimension the number of the column from which it is taken, thus:—

| ROUGH CUTTING. | |
|---|---|
| 44·9 | (54) |
| 87·3 | (58) |

This greatly facilitates reference, and in the case of large works saves much time, for it sometimes happens that after an abstract has been ostensibly checked, some item is discovered without a tick against it, and time is lost in attempting to find the dimensions: by stating the column this is avoided. In abstracting from dimensions where one regular and known order of taking off is adopted, the abstracting of the column number is not so essential, but in measuring from the actual work the order followed depends so much upon accidental circumstances that the exact place of a dimension in the measuring book is (without this practice) very difficult to determine. Write references to books thus: $\frac{50\ (\text{page})}{110\ (\text{book})}$. When a dimension is corrected in the abstract, the number of the column should always be placed against it, so that the correction may be easily verified. The corrections should always be checked.

When an item in the abstract is in the wrong place refer to it by some mark (as a star) in the right place.

To shorten the bill, averaging on the abstract should as much as possible be adopted. It should be observed that where it is desired to produce an average size, one of the dimensions of each item entering into the average should be similar to that of the others, as otherwise the result will be incorrect. When the conditions are as follows it will be right:—

Sashes and Frames as described.

| | ft. | in. | ft. | in. |
|---|---|---|---|---|
| 2 = | 4 | 0 × | 6 | 0 |
| 2 = | 4 | 0 × | 8 | 0 |
| 4 = | 8 | 0 × | 14 | 0 |
| Average, | 2 | 0 × | 3 | 6 |

The correct method, where the dimensions vary, is to find the superficial contents of each, and average them, thus:—

| | ft. | in. | ft. | in. | ft. | in. | |
|---|---|---|---|---|---|---|---|
| 3/ | 1 | 8 × | 2 | 6 = | 12 | 6 | superficial. |
| 2/ | 2 | 0 × | 3 | 0 = | 12 | 0 | „ |
| | | | | 5) | 24 | 6 | „ |
| | | | | | 4 | 10 | average. |

See also section, Abstracting, p. 131.

Some examples of suitable items for averaging in various trades are as follows:—

Bricklayer.—The lengths of ventilating or smoke flues when measured by the foot run.

The thickness of the walls for eyelets and perforations.

The length, depth, and thickness of arches when numbered.

Mason.—The size of perforations through stone of the same kind and thickness.

Girth of mitres, stopped ends, &c., to mouldings and splays.

Size of stone templates of the same thickness.

Slate Mason.—Girth of notchings, size of sinkings, and perforations.

Carpenter.—Size of cesspools.

Joiner.—Size of small casements and frames or sashes and frames.

Girth of notchings, lengths of balusters.

Plasterer.—Girth of mitres, stopped ends, &c., to mouldings and splays.

Founder and Smith.—Length of bolts of each diameter.

Height of hoisting of iron columns, girders, &c.

Plumber.—Short lengths of pipe where similar labours.

The order of the abstracts, and consequently of the bills, is as follows:—

No. 1. Preliminary and provisions.
„ 2. Excavator and drains.
„ 3. Bricklayer.
„ 4. Mason.
„ 5. Slater, tiler, and slate (or marble) mason.
„ 6. Carpenter.
„ 7. Joiner and ironmonger.
„ 8. Plumber and zincworker.
No. 9. Plasterer.
„ 10. Founder and smith.
„ 11. Gasfitter
„ 12. Bellhanger.
„ 13. Glazier.
„ 14. Paperhanger.
„ 15. Painter.
„ 16. Separate estimates.

A few *general* rules for abstracting should be remembered.

Write the name of the work and the trade at top of each sheet.

If you have more than one abstract to a trade, number them consecutively, No. 1, No. 2, &c.

Commence with the leading items of the trade.

Then follow with *cubic* dimensions, *superficial* dimensions, *lineal* dimensions, *numbers.*

Items of labour only should always precede those which involve labour and material.

In all cases commence with the items of the smallest value. In lineal dimensions—carpenter and joiner—this will be disregarded, size will regulate the process, as 1 inch + 2 inches, 1 inch × 2¼ inches, 1 inch × 2½ inches, &c.; but the order of size may sometimes be departed from, as 1½ × 2 rough fillet, 1½ × 3 ditto, 1½ × 3½ ditto, &c., recommencing with a smaller size, 1½ × 2¼, chamfered fillet, &c. (See also p. 129.)

When an item has been measured lineally and there are extra labours upon it, it is better that they should immediately follow the lineal dimensions (see "writing short," p. 139.)

In casting abstracts, deducting or averaging, use blue ink.

For checking use red ink.

The examples of abstracts will sufficiently explain themselves. (See examples, p. 131.)

Where the description of an item is long it need not be completely copied in the abstract, but the description may be partly copied into the abstract, and the dimensions referred to by the number of the column of the dimensions for the remainder.

The abstracter should never alter the phraseology of any items in the dimensions without consulting the "taker off"; if he does so he is very liable to error.

*Preliminary.*—The first part of the abstract will be a collection of preliminary items, and it is a good plan to begin each of these with the word "allow," so as to clearly distinguish them from provisional items, the former being at the risk of the contractor, the latter being adjusted at completion according to proportion of amount or quantity expended or used. (See also p. 140).

Where the work consists partly of alterations the items of alteration should follow the general preliminary items.

*Provision.*—The amounts provided are better placed together at the beginning of the series of bills. It is the practice of some surveyors to put provisional items at the end of the trade to which they belong. The former method saves trouble and is better, unless the work is tendered for by separate tradesmen, in which case the latter course must be adopted.

Where the precise quantity of the work which is intended to be executed, and for which the sum is provided, is known, it is better to state the quantity as well as the amount. For instance. "Provide for 20 feet of iron railing, 30*l.*"

Where the provision consists of material, it is better to place it in the same position in the bill as it would hold if it were not a provision, but write it in the manner following:—

| ft. in. | | |
|---|---|---|
| 100 0 | Cube. | Fir framed in roofs. *As provision.* |

*Excavator.*—Where there are but few items and few kinds of material the general rotation as to "cubes," "superficials." and "runs," may be maintained; where there are many it will save writing and be more convenient for pricing to adopt the order—cubic and superficial quantities of excavation, then cubic and superficial quantities of concrete, &c., then drains and cesspools.

*Bricklayer.*—In abstracting brickwork always prefer to abstract into the one and a half brick column, where equally convenient, as this saves reducing. The methods are as described below:—

50 feet superficial of half brick thick may be abstracted as 25 feet of one brick, or 16 feet 8 inches of one and a half brick.

50 feet superficial of two bricks thick as 100 feet of one brick.

50 feet superficial of two and a quarter bricks thick as 25 feet of one and a half brick and 50 feet of one and a half brick.

There is far less liability to error in the abstracting of brickwork if the deductions are placed in the position shown on the abstract (see p. 131) than if arranged as follows:—

| *One brick.* | *One brick deduct.* | *One and a half brick.* | *One and a half brick deduct.* |
|---|---|---|---|

In abstracting, observe the principle of reducing on the abstract, not on the dimensions, the latter is a frequent cause of error. Some abstracters, to avoid making a heading for a cube brickwork, deduct $\frac{1}{9}$th from each item of it in the dimensions, thus reducing as they go on; this is not a good practice. Abstract it as cube brickwork—deduct $\frac{1}{9}$th from the total, and carry it to the reduced brickwork when you prepare the abstract for billing.

Be careful that unwary assistants do not divide cubic dimensions by 9 instead of 27, and *vice versâ.*

Where there are various kinds of facings and a good number of items of extra labours upon the facing it is advisable to let an abstract of them follow the general abstract, but otherwise they may come in with the general items of the bill.

Small metal articles which involve bricklayers' work in the setting are usually billed with the bricklayers' work at the end of the numbers.

*Mason.*—Keep the various kinds of stone separate. Commence with the stone of least value.

Keep the items of "stone and labour" separate.

*Slater, Tiler, Slate and Marble Mason.*—Keep the work to each trade separate, following the usual rotation—superficials, runs, numbers.

*Carpenter.*—Abstract joists to flats with fir framed in roofs.

Keep the different kinds of wood separate.

In a small work it will be sufficient to adopt the common practice of arrangement—cubes, superficials, runs, numbers, according to value. In the case of a large work it is sometimes more convenient, and a saving of writing, to divide the work in sections as where there is a large number of lineal items of "fir wrought and framed in white lead" of various sizes and with various labours upon them; spires, flèches, and dormers are often kept separate in the same manner with advantage.

Any separate section should follow the *numbers* of the general carpentry.

Where "fixing only" to ironwork has been taken it should come last in the abstract.

In abstracting things measured by the foot run and of various sizes, 2 inches by 3 inches, 4 inches by 6 inches, &c., take them in the order of their scantlings, the smallest first, disregarding the fact that some of the smaller ones are of more value than the larger, because of the greater amount of labour upon them.

*Joiner and Ironmonger.*—The usual order is as follows:— "Floors," "skirtings," "skylights and sashes and frames," "doors," "architraves and mouldings" (if a considerable number of items, if not abstract with sundries), "thicknesses and framings," "sundries," "staircases," "work in mahogany," "wainscot," &c., keeping each kind of wood separate; "ironmongery and fixing," or, where a sum has been provided, "fixing only ironmongery."

*Plumber and Zincworker.*—Abstract the lead first, under the heading of its weight, as 4 lbs., 5 lbs., &c., and afterwards reduce it to cwts.; abstract together lead in gutters, flats, flashings; abstract together stepped flushing and secret gutters; then labours to the lead, copper pipes, lead pipes, soldered joints, and labours to pipes, short lengths of pipe, traps of various kinds, brasswork, lavatories, w.c. apparatus, baths, urinals, cisterns.

When internal and external plumbery is kept separate the same order is adopted for each.

The zincworker may follow the plumber. Superficials, runs, numbers.

*Plasterer.*—Commence with the common plastering, and keep the various kinds separate, then work in fine plaster.

Work in cement, keeping each kind, as Portland, Martin's, Keen's, separate.

Plastering in narrow widths and small quantities should always be billed in feet.

Sometimes the external and internal plastering are separately billed, but only in a large work.

*Founder and Smith.*—Keep the cast and wrought iron separate. Reduce all to weight. The same constant of weight should be used for wrought iron and rolled iron.

When the abstracting is completed, cast up all the columns, deduct the deductions, and reduce each item that requires reduction; let every process be checked, and you will then be ready for billing. When columns are very long it will always be a saving of time to divide them into several casts. Let your calculations on the abstracts be exact, any adjustment as to measure or weight should be left until the time of billing.

## EXAMPLES TO ILLUSTRATE ABSTRACTING.

(See also form of Bill.)

### BRICKWORK AND ITS REDUCTION.

"*Bricklayer No.* 1."

"For description of material see Col. 40 dims."

Reduced Stock Brickwork in Mortar.

| | Cube. | | 1 B. | 1½ B. | Deductions. Cube. | Deductions. 1 B. | Deductions. 1½ B. |
|---|---|---|---|---|---|---|---|
| | 100 0 | | 100 0 | 100 0 | 10 0 | 10 0 | 10 0 |
| | 100 0 | | 100 0 | 100 0 | 10 0 | 10 0 | 10 0 |
| | 100 0 | | 100 0 | 100 0 | 10 0 | 10 0 | 10 0 |
| | 300 0 | | 300 0 | 300 0 | 30 0 | 30 0 | 30 0 |
| | 30 0 | | 30 0 | 30 0 | | | |
| | 270 0 | | 270 0 | 270 0 | | | |
| ⅑th = | 30 0 | ⅓rd = | 90 0 | 180 0 | | | |
| | 240 0 | | 180 0 | 240 0 | | | |
| | | | | 690 0 | | | |
| | | | | 2 rods, 146 feet. | | | |

*Hoop Iron.*

Add 5 per cent. for laps.

1¼" × 1/16" hoop-iron bond and laying in walls.

100 0
100 0
100 0

300 0
5 per cent. = 15 0

315 0 = 105 yards
·27

85 lbs.

0 3 1

*Billed as—*

| yds. | ft. | in. | | |
|---|---|---|---|---|
| 105 | 0 | 0 | run | 1¼" × 1/16" hoop-iron bond and laying in walls (weight, ¾ qrs. 0 lbs.) |

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*Perforations in brickwork.*

Perforations in wall for pipe and making good.

10 = 20 bks.
10 = 20 „
10 = 15 „

30 = 55 bks.
Average, 1¾ bks.

*Billed as—*

No. 30 Perforations in wall average 1¾ bricks thick for pipe and making good.

---

*Arches.*

Extra labour and materials cutting and waste to relieving arches.

| | ft. | in. | B. | B. |
|---|---|---|---|---|
| 10 = | 100 | 0 × | 10 × | 15 |
| 10 = | 100 | 0 × | 10 × | 15 |
| 10 = | 100 | 0 × | 10 × | 15 |
| 30 = | 300 | 0 × | 30 × | 45 |
| | 10 | 0 × | 1 B. × | 1½ B. averaged. |

Ditto to segmental arches.

| | ft. | in. | B. | B. |
|---|---|---|---|---|
| 10 = | 100 | 0 × | 10 × | 15 |
| 10 = | 100 | 0 × | 10 × | 15 |
| 10 = | 100 | 0 × | 10 × | 15 |
| 30 = | 300 | 0 × | 30 × | 45 |
| | 10 | 0 × | 1 B. × | 1½ B. averaged. |

*Billed as—*

No. 30 Extra labour and materials cutting and waste to rough relieving arches.
10 ft. 0 in. × 1 brick × 1½ brick averaged.
„ Ditto, segmental, 10 ft. 0 in. × 1 brick × 1½-brick, ditto.

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*Labour on Facings—*

Moulded cornice two courses high moulded 7" girth as sketch, col. 82.

| | | Mitres. | Stops. |
|---|---|---|---|
| 100 | 0 | 10 | 10 |
| 100 | 0 | 10 | 10 |
| 100 | 0 | 10 | 10 |
| 300 | 0 | 30 | 30 |

*Billed as—*

| ft. | in. | | |
|---|---|---|---|
| 300 | 0 | run | Extra on facings for moulded cornice two courses high and 7½ in. girth, as sketch. |
| | | | No. 30 mitres. |
| | | | „ 30 stops. |

**Method of arrangement by which the repetition to every item of the words "framed and wrought" is avoided.**

**Fir framed and wrought all round where required.**

| 2½ × 2½ bearer. | | Do. plugged. | |
|---|---|---|---|
| 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 |
| 300 | 0 | 300 | 0 |

*Lead.*

**Milled lead and labour in flats, gutters, flashings, &c.**

| 4 lb. | | 5 lb. | | 6 lb. | | 7 lb. | |
|---|---|---|---|---|---|---|---|
| 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 |
| 300 | 0 | 300 | 0 | 300 | 0 | 300 | 0 |
| | 4 | | 5 | | 6 | | 7 |
| 1200 | lb. | 1500 | lb. | 1800 | lb. | 2100 | lb. |

1200 lb.
1500
1800
2100
6600

| cwt. | qrs. | lbs. |
|---|---|---|
| *58* | *3* | *20* |

*Billed as—*

| cwt. | qrs. | lbs. | |
|---|---|---|---|
| 58 | 3 | 21 | Milled lead and labour in flats, gutters and flashings. |

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*Plastering.*

| Twice whiten ceilings and soffits. | Render float and set walls. | Ddt. | And 2ce whiten. Lath plaster float and set ceilings. | Ddt. | And 2ce whiten. Lath plaster float and set soffits. | Ddt. |
|---|---|---|---|---|---|---|
| 270 0 | 100 0 | 10 0 | 100 0 | 10 0 | 100 0 | 10 0 |
| 270 0 | 100 0 | 10 0 | 100 0 | 10 0 | 100 0 | 10 0 |
| 540 0 | 100 0 | 10 0 | 100 0 | 10 0 | 100 0 | 10 0 |
| 60 yds. | 300 0 | 30 0 | 300 0 | 30 0 | 300 0 | 30 0 |
| | 30 0 | | 30 0 | | 30 0 | |
| | 270 0 | | 270 0 | | 270 0 | |
| | 30 yds. | | 30 yds. | | 30 yds. | |

The words "twice whiten" being written in the foregoing manner over all the items which are whitened, the totals as soon as all are abstracted, should be re-abstracted in the proper place ready for billing.

Mitres to moulding.

| | ft. | in. |
|---|---|---|
| 100 = | 50 | 0 |
| 100 = | 100 | 0 |
| 100 = | 66 | 8 |
| 300 = | 216 | 8 |

8½ in. average.

*Billed as—*

No. 300 Mitres to moulding average 9 in. girth.

---

*Founder and Smith.*

| | Exact weight. |
|---|---|
| C. I. weighed at 38 lbs. per foot supl. of 1 in. | (37·50) |
| W. I. „ 41 lbs. „ „ | (40·32) |

*Cast Iron.*

In No. 10 girders and fixing 20 feet from ground level.

× ——————— ×

| | Supl. ½ in. | | | Supl. ¾ in. | |
|---|---|---|---|---|---|
| | 100 | 0 | | 100 | 0 |
| | 100 | 0 | | 100 | 0 |
| | 100 | 0 | | 100 | 0 |
| (A) | 300 | 0 | (B) | 300 | 0 |

Girders collected.

| | 1″ iron, supl. | |
|---|---|---|
| (A) | 150 | 0 |
| (B) | 225 | 0 |
| | 375 | 0 |
| | 38 | |
| | 14250 lbs. | |

| cwt. | qrs. | lbs. |
|---|---|---|
| 127 | 0 | 26 |

| Pattern for girder 11 ft. 6 in. long and 9in. wide as sketch col. 18. | Alteration to do. |
|---|---|
| 1 | 1 |

In No. 20 hollow columns and fixing at ground level,

| Supl. ½ in. | | Supl. 1 in. | |
|---|---|---|---|
| 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 |
| 300 | 0 | 300 | 0 |

| 1¼ in. | | 2 in. | |
|---|---|---|---|
| 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 |
| 300 | 0 | 300 | 0 |

Columns.

| 1″ collected. | |
|---|---|
| 150 | 0 |
| 300 | 0 |
| 375 | 0 |
| 600 | 0 |
| 1425 | 0 |
| 38 | |

| cwt. | qrs. | lbs. |
|---|---|---|
| 483 | 1 | 26 |

| Pattern for hollow column with moulded cap, base, and necking and four brackets, 8 ft. high in all. | Alterations to do. |
|---|---|
| 1 | 4 |

*Billed as—*

| cwts. | qrs. | lbs. | |
|---|---|---|---|
| 127 | 1 | 0 | In No. 10 panelled girders and hoisting and fixing 20 ft. from ground level. |
| | | | No. 1 pattern for panelled girder 11 ft. 6. in. long and 9 in. wide, as sketch. |
| | | | No. 1 alteration to ditto. |

| cwt. | qrs. | lbs. | |
|---|---|---|---|
| 483 | 2 | 0 | In No. 20 hollow columns and fixing at ground-floor level.<br>No. 1 pattern for hollow column with moulded cap, base, and necking, and four brackets, 8 ft. high in all.<br>No. 4 alterations to ditto. |

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*Wrought Iron.*

Add 5 per cent. for rivets.

In No. 6 riveted girders.

| Supl. ⅜ in. | |
|---|---|
| 100 | 0 |
| 100 | 0 |
| 100 | 0 |
| 300 | 0 |
| 112 | 6 |

| Supl. ½ in. | |
|---|---|
| 100 | 0 |
| 100 | 0 |
| 100 | 0 |
| 300 | 0 |
| 150 | 0 |

| Supl. ⅝ in. | |
|---|---|
| 100 | 0 |
| 100 | 0 |
| 100 | 0 |
| 300 | 0 |
| 187 | 6 |

| Supl. ⅞ in. | |
|---|---|
| 100 | 0 |
| 100 | 0 |
| 100 | 0 |
| 300 | 0 |
| 262 | 6 |

Girders collected.

| Supl. 1 in. | | |
|---|---|---|
| 112 | 6 | |
| 150 | 0 | |
| 187 | 6 | |
| 262 | 6 | |
| 712 | 6 | |
| 41 | | |
| 29213 lb. | | |
| 1461 = 5% | | |
| 30674 lb. | | |
| cwt. | qrs. | lb. |
| 273 | 3 | 14 |

*Billed as—*

| cwt. | qrs. | lb. | |
|---|---|---|---|
| 273 | 3 | 14 | In No. 6 riveted girders and hoisting and fixing 20 ft. above the ground level. |

*Bolts.*

| Under 12 in. long. | | Over 12 in. long. |
|---|---|---|
| ½ in. diameter screw bolts — long, with heads, nuts, and washers, and fixing by carpenter. | ⅝ in. ditto. | ¾ in. diameter screw bolts — long, with heads, nuts, and washers, and fixing by carpenter. |
| in. | in. | in. |
| 10 = 100 | 10 = 100 | 10 = 200 |
| 9 = 90 | 10 = 100 | 10 = 250 |
| 10 = 80 | 10 = 100 | 10 = 150 |
| 29 = 270 | 30 = 300 | 30 = 600 |
| 9 in. average. | 10 in. average. | 20 in. average. |

*Billed as—*

No. 29 ½ in. diameter screw bolts, under 12 in. long, average 9 in. long, with heads, nuts, and washers, and fixing by carpenter.
„ 30 ⅝ in. ditto, 10 in. long, and ditto.
„ 30 ¾ in. ditto, over 12 in. long, average 20 in. long, and ditto.

---

*Glass.*

21 oz. sheet glass and glazing in squares not exceeding . . . feet supl.

| 2 ft. | 0 in. | 4 ft. | 0 in. | 5 ft. | 0 in. |
|---|---|---|---|---|---|
| 100 | 0 | 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 | 100 | 0 |
| 100 | 0 | 100 | 0 | 100 | 0 |
| 300 | 0 | 300 | 0 | 300 | 0 |

*Billed as—*

| ft. | in. | | |
|---|---|---|---|
| 300 | 0 | supl. | 21 oz. sheet glass in squares not exceeding 2 ft. 0 in., and glazing. |
| 300 | 0 | „ | 21 oz. ditto, 4 ft. 0 in., and ditto. |
| 300 | 0 | „ | 21 oz. ditto, 5 ft. 0 in., and ditto. |

*Paper.*

Paper
P.C. 2*s.*
per piece,
and
hanging.

100 0
100 0
100 0

54) 300 0

5 pieces 30 ft.

*Billed as—*

No. 6 Pieces of paper P.C. 2*s.* per piece, and hanging.

## BILLING.

The general rule as to order of billing is to begin each trade with the principal item of that trade, as—Bricklayer, rods of brickwork; mason, cubic feet of stone; slater, squares of slating; carpenter, cubic feet of timber; joiner, squares of flooring; founder and smith, cwt. of iron; plumber, cwt. of lead, &c., and generally speaking, adhere as closely as possible to the order, cubes, suprs., runs, numbers.

Any total in the abstract having odd inches is billed as a foot when six inches or over, and where under six inches the inches are discarded, thus—4 feet 6 inches is called 5 feet, 4 feet 5 inches is called 4 feet. In work priced per yard cube 13½ feet is called a yard, under 13½ feet is rejected. Similarly, when work is priced at per square, parts of 5 feet are treated as 5 feet, or discarded, thus—108 feet would be called 1 square 10 feet, 107 feet 1 square 5 feet, 72 feet 70 feet, 73 feet 75 feet. This practice saves much trouble in pricing, and in works of fair size the differences neutralise each other; but in *small* measured accounts it is better to adopt the exact quantities.

In plastering or painting, where half a yard superficial, call the dimension a yard; where under half a yard, disregard it.

Materials charged per cwt. proceed on the same principle, calling the lbs. 0, 7, 14, or 21, when less than a quarter.

Where there is any departure from the usual mode of measurement the fact should be stated in the preamble of the bill.

In items where scantlings are stated, put the smaller one first, as 6 inches by 8 inches, and write the name of the article immediately after the size, and before describing the labour, as, for instance, 6 inches by 8 inches *fascia*, moulded 6 inches girth.

Repeat the figures of scantlings or thicknesses when billing, as

3″ × 4″ wrought and framed rail.
3″ × 4″ „ „ twice splayed.

not

„ × „ „ „ twice splayed.

Numbers also should invariably be repeated when similar.

Where a number of items are in deal, and others in pitch pine, mahogany, &c., a heading will save the repetition of the words deal, pitch pine, &c., thus: "Door in *deal*," "Skirtings in deal," "Best Honduras mahogany," &c., and generally, if there are many items of a sort, judicious headings will save writing.

Gratings, air bricks, &c., connected with the general construction and which involve the labour of a bricklayer or carpenter, should be billed at the end of the trade with which they are connected.

In some cases it is found convenient to give the detailed quantities of a particular item, so that a separate amount may be arrived at; this is called "writing short" (see **A** below). Another case in which the same plan is adopted is that of the extra labours on work measured lineally (see **B** below). In cases like **A** inches may be stated.

In writing the bills keep the whole of one item on the same page, and do not write parts of the same word on two lines.

When it is desired that an article shall be supplied by a particular person, insert his name and address, with the description of the said article.

Carefully observe that the words *cube*, *superficial*, *run*, *number*, are written in where these divisions commence, as, to take an instance, the word *run* is sometimes omitted where the superficials terminate, and the lineal dimensions consequently appear to be superficial.

A.—No. 1 Stepladder, as detail following, viz.:—

| ft. | in. | | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|
| | 6 | Cube, fir framed .. .. .. .. .. .. .. | | | | | | |
| 43 | 0 | Superficial planing .. .. .. .. .. .. | | | | | | |
| | 6 | " 1¼-inch rough batten landing, with open joints .. .. .. .. .. | | | | | | |
| 3 | 6 | " 1¼-inch deal rough lining .. .. | | | | | | |
| 40 | 6 | " 1¼ " " treads .. .. | | | | | | |
| 13 | 6 | " 1¼ " " " framed.. | | | | | | |
| 47 | 6 | " 2 " " framed strings | | | | | | |
| 37 | 0 | Run, labour to rounded edge to 3 inches fir .. | | | | | | |
| No. | 84 | Housings of treads .. .. .. .. .. .. | | | | | | |
| | 8 | Ogee cut ends to bearers, 6 inches by 3 inches | | | | | | |
| | 9 | Ends of bearers, &c., cut and pinned into wall | | | | | | |
| | | Amount of stepladder .. .. .. £ | | | | | | |
| | | Carried to adjoining column. | | | | | | |

B.

| ft. | in. | | |
|---|---|---|---|
| 50 | 0 | Run | 3 inches by 9 inches window sill, tooled, sunk, weathered, and throated.<br>No. 20 fair ends. |

Observe that the words "and including" be used where required, as in describing tiling and lathing, write "*on and including* 1½ × ¼ sawn fir laths," or in description of doors when glass is beaded in, "*with and including* mitred and screwed beads for glass."

Observe also the distinction between "as pattern" out of stock, if not more definitely described, and "to detail" or "to design."

Take care that, so far as possible, the same word has but one meaning throughout the set of bills, especially the words "provide" and "allow." It is convenient to apply the word "provide" to those amounts or quantities which are provided, and which will be the subjects of future adjustment, and the word "allow" to all items the cost of which are at contractor's risk, and not subject to interference. "Allows" should consequently not be deducted. (See p. 127.) It is not expedient to contract any of the words in a bill; write *all at* full length.

Sometimes you may save labour by billing items without abstracting; in such case write against them in dimensions "to bill direct."

Either *every* trade may have a separate bill, or two or three trades may be put into one bill, or the bill may be continuous; in either case each of the *trades* will be carried separately to summary, and each *bill* will have a heading similar to the following:—

Estimate,
For proposed house and offices at Sutton, Surrey, for John Smith, Esq.

———, Esq., Architect,
24, Montague Square,
*July* 1878. London, W.C.

It is often convenient when part of the work is new and part alteration to old, to make a separate bill of the alterations; the builder in the latter case will have to take this bill only to the site.

Head each trade with number and trade, thus—"No. 2. Excavator and drains."

The sketches should be drawn in the bill before any checking is done, so that they also may be checked.

*Preliminary Bill.*—This should commence with clauses from the conditions which may affect the amount of tender, such as the following:—

"The site is on the north side of the road leading from Kew "to Richmond, and opposite to the Cumberland Gate of Kew "Gardens" (description of position will often be unnecessary beyond the heading of the bill).

"The building to be completed fit for occupation by the . . . day of . . . under a penalty of £ . . . per week as liquidated damages, delay consequent upon strikes only excepted." Sometimes, "in case of extra works, the time shall be extended one week for every £100 worth of additional work."

"Payments will be made to the contractor at the rate of 75 per cent. upon the value of the work executed until completion, when an additional 20 per cent. will be paid, and the remaining 5 per cent. at the expiration of six months."

The "Conditions of Contract" published by the R.I.B.A. involve a different arrangement: "When the value of the works executed, and not included in any former certificates, shall from time to time amount to the sum of £ . . . , or otherwise at the architect's reasonable discretion, the contractors are to be entitled to receive payment at the rate of 80 per cent. upon such value until the difference between the percentage and the value of the works executed shall amount to 10 per cent. upon the amount of the contract, after which time the contractors are to be entitled to receive payment of the full value of all works executed and not included in any former payment, one moiety of the balance being paid on completion, and remainder in . . . months."

The payment and maintenance clauses are various, and have to be drawn to meet special cases. Architects' instructions usually regulate these.

"No part of the work to be let as task-work."

"A fully-priced copy of the estimate (*sometimes sealed*) is to be deposited with the architect within a week of signing contract, extras and omissions to be valued at the prices of the contract, *and any item of extra work which does not exactly agree with the descriptions of the original estimate to be valued at a price analogous thereto.*" Sometimes "the quantities will form part of the contract."

The clause commonly appears without the part in italics, when it does the builder will argue that the rates of the original estimate shall be only applied to such items of extra work as are exactly described in the bill of quantities.

This condition, if uniformly adopted, will produce in course of time an improvement in the system of tendering. When a large quantity of extra work has been anticipated, builders have sometimes priced their original estimate at an absurdly low rate, with the idea of making their profit by charging an exorbitant price for the extra work.

"The contractor will be required to keep an approved foreman constantly upon the works."

"For the remaining conditions see the copy appended to the specification."

"Allow for insurance from fire to the amount of (two-thirds, or as the case may be) of the amount of tender, in such manner as may be directed, and make good after fire."

"Allow for supplying water for all the works, including fees, temporary plumbing, and storage of water."

"Allow for giving notices to all authorities requiring notice, and pay all fees. (The fee for District Surveyor is for a building . . . storeys in height, and not exceeding . . . squares in area.)" The foregoing part in parenthesis applies only within the jurisdiction of the Metropolitan Board of Works.

Observe that where a new building is connected with old ones, District Surveyor's fees must be included for them as well as for the new ones; reference to the schedules of the Building Act will show how. Include also the fee for inspection under the new bye-laws of the Metropolitan Board of Works.

"Allow for each trade to attend upon all other trades, and for all jobbing connected therewith." This clause will not supersede the necessity of special items for attendance.

"Allow for all scaffolding, rods, &c., and stakes and labour in setting out the works."

When the building is large, leave out the word scaffolding in previous clause and insert the following:—

"Allow for the necessary scaffolding for a building about . . . feet long, by . . . feet wide, and . . . feet from ground to ridge, with . . . chimney stacks rising to a height. . . feet from ground, and a turret rising to a height of . . . feet, and including an apartment . . . feet by . . . feet, and . . . feet high." (The latter clause when there is a very large room or hall involving internal scaffolding.)

"Allow for an office for clerk of works and the requisite firing, light, and attendance, and for all sheds, &c., required for keeping materials under cover." If any materials not usually protected are to be kept under cover they should be particularized.

"Allow for proper latrines for the workmen, for keeping same in a clean and decent condition, and for emptying as may be required, and removing at completion."

"Allow for enclosing the site with an approved post and rail fence, and for preventing the men from trespassing upon any other part of the ground beyond that enclosed." The foregoing in case of a park or garden.

"Allow for covering the walling during inclement weather, and for providing all requisite temporary lights, doors, water-shoots, covering to stonework and terra-cotta, tile pieces to steps, and any other requisite protection to the whole of the works."

"Allow for making good any injury to the building from any cause, and for making good pointing after injury from frost."

"Allow for making good any injury to adjoining buildings consequent upon these alterations."

"Allow for necessary watching and lighting."

"Allow for keeping foundations free from water, and for any temporary drainage, bailing, or pumping that may be required."

"Allow for clearing away all dirt or rubbish and superfluous materials as they accumulate, for washing (or twice scrubbing) floors at completion, and for leaving the whole of the premises clean."

"Allow for affording facilities to any other parties employed upon the buildings, so that their works may proceed during the progress of the contract, and allow them use of ordinary scaffolding and ladders."

"Allow for keeping the works in proper repair for . . . months (usually six) after completion, and for making good any defects or imperfections which may arise during that period."

"Allow for erecting, maintaining, and altering as may be required, and afterwards removing, a hoarding, with the necessary gates and fastenings, fans, planked footway, post and rail fence, &c., to the satisfaction of the local authorities, for a length of . . . feet, with two returns . . . feet in length." The foregoing would apply in a public thoroughfare.

Sometimes the right of letting the hoarding to an advertisement contractor is reserved by the proprietor.

"Allow for carrying on the works while the present buildings are in use." This applies in case of additions.

In case of an erection on the site of an old building—

"Allow for emptying any old drains or cesspools that may be met with in course of excavation, and for filling in same with hard, dry brick or stone rubbish, or lime core, well rammed."

"The contractor to send in with his tender the names of two responsible sureties who are willing to be bound with him in the sum of £ . . . for the due completion of the contract and the bond to be executed on the signing of the contract."

The foregoing is a general outline of the most frequent requirements, but in almost every building some special conditions will be required to meet the exigencies of the case.

The general rule is to embody in the preliminary bill any condition which is likely to affect the value of the work.

In the case of an estimate comprising works of alterations the items of alterations, i. e. such as are not measured for quantity, should follow here, and they should be arranged in such order that the contractor would, in reading the items, go through the building, beginning with the topmost floor, for instance, and dispose of it without any necessity for his return to that part of the building. In all cases state the exact position of the work.

Where there are a very large number of items of alteration some surveyors make a separate bill of them.

"Allow for pulling down," &c.; describe the pulling down. ("See Bill No. 20.") See also remarks on *credits* bill.

If any part of the work is in darkness, as in the case of sub-basements, it should be stated.

Sometimes the following, "allow for laying on temporary gas pipes to new basement, and for paying for the necessary gas, candles, &c."

*Alterations.*—When the estimate is mainly for the alteration of an old building, it will greatly assist the estimator if you place at the beginning of the preliminary bill an item similar to the following:—

"The work consists of raising the building by an additional story, of building a new kitchen and dining-room adjoining the north wall of the building, and a billiard-room, with conservatory over, adjoining the south wall, and of various small alterations and additions throughout the old building."

"Insurance from fire, and the water company's fees will be paid by the proprietor, but contractor to allow for any temporary plumbing and storage of water."

The whole of the inserted work, as mouldings, panellings, &c., to match old.

Special reference to scaffolding is also expedient, thus:—

"Allow for erecting a strong scaffold about 36 feet long and to a height of 50 feet from ground level as may be necessary, for the raising of additional story, and include cutting out and making good all putlog holes, and for removal of scaffold at completion."

"Allow for any necessary shoring and strutting while underpinning eastern wall and chimney breast about 22 feet run."

A small block plan, lettered A, B, C, &c., is a useful appendage to a bill of quantities of alteration, and makes the items easier to understand.

*Provisions.*—The points connected with provisions which required attention are the *packing, carriage, profit, and fixing.* Various methods of treatment of the same item appear below. Always state carefully what the sum provided is to cover.

To meet the question of profit it is sometimes stated that the amounts provided are to be paid net to any tradesman selected by the architect on his certificate.

A clause such as this will define the position you take:

"provide the following sums to be used as directed or deducted if not required. If contractor desires a profit he must add it to the amount named in each case."

Allow on all provisions for carriage and fixing.

Sometimes all the following provisions, to include fixing, unless specially described otherwise.

Provide the sum of £100 for ten chimneypieces, and allow also for packing, carriage, profit, and fixing, including the necessary cramps.

Provide the sum of £100 for ten chimneypieces and fixing.

Provide the sum of £100 for ten chimneypieces (fixing elsewhere taken).

Provide for modelling of terra-cotta £ . . .

Provide for extra works £ . . .

It is seldom safe to provide less than 5 per cent. upon the estimated cost of the building for extra works. Submit the provided amounts to the architect for his approval before the bills are lithographed.

When the quantity of work for which a provision of money is made is not settled, it is not fair to add "allow for fixing."

It may be necessary to measure a considerable amount of work in connection with provisional sums, and in such cases it is convenient to make a separate bill of the provisions, commencing with the sums provided, and following with the collateral works in the usual order of a bill.

The examples of preambles to trades which follow will, of course, be considerably modified in special cases, and by the specification of the particular work.

*Piling, Coffer Dams, &c.*—"The prices of piling and dams to include spikes, nails, oak treenails, and all workmanship and labour in preparing and connecting timbers together by lapping, notching, bevel, or birdsmouth cuttings, including boring for bolts."

"The driving of piles to include use of pile engine, staging and hoops or rings."

"Allow for barges or floating stages, which will be necessary for a part of the work."

"Contractor must make his own arrangements and allowances as to tide work."

*Excavator and Drains.*—Commence with a description of materials, &c., something like the following:—

"The concrete to be composed of one part fresh ground stone lime, and six parts of clean ballast and sand, thrown from stages not less than six feet from the bottom of the trench."

"All excavation to *trenches* to include strutting and planking, and grubbing up old foundations, if required." The foregoing when it has not been measured, and the use of this clause is better of the two.

"Sand and gravel sufficient for the builders' purposes may be obtained upon the site, but none to be carted away, and the contractor is to properly fill up any excavation made by him for that purpose," or "it is believed that sand and gravel, &c."

This is an item which will often save considerable expense, but the surveyor must be quite certain that the case is as he describes it.

The drains will follow the items of excavation and concrete, with a heading something like the following:—

*Drains, as provision.*

("As provision," if their course is not thoroughly determined.)

"The drains are to be glazed stoneware socketed pipes, of the best quality, half-socketed at junctions (or every 10 feet, or both), laid to falls in trenches, upon a well-rammed bottom, jointed in Portland cement, and the joints puddled around with clay. Including excavation, filling in, ramming, carting away (or otherwise removing) surplus earth, and any necessary strutting and planking, and cleaning out at completion."

*Waller and Bricklayer.*—The rubble for walling to be obtained from . . . quarry, to be free from flaws, sand or clay holes, and to be selected for hardness. The bricks to be sound, hard, square, and well burnt and truly shaped, and free from all defects, and equal to samples deposited with and approved by the architect before signing of contract."

"No soft or place bricks, broken bricks, or bats, will be allowed to be used, except where required for bond."

"The lime to be," &c. Description.

"The sand to be clean and sharp, and washed if required."

"The mortar to be composed of one part of lime to three parts of sand, mixed in a mortar mill, and in quantities sufficient only for the day's consumption."

If selenitic lime—"The lime to be selenitic, used and mixed exactly in accordance with the company's printed instructions."

"The cement to be the best Portland, weighing not less than 112 lbs. per bushel, and to bear a tensile strain of 600 lbs. on 1½ inch square after being set in water seven days (or give maker's name), mixed in the proportions of one of cement to three of washed sand, and no cement that has once set is to be used."

"The bricks to be well wetted before being laid."

"The brickwork to be thoroughly flushed up with mortar (state if grouted), to be laid Old English (or Flemish) bond; no four courses to rise more than 1 inch higher than the bricks when laid dry."

"The price of brickwork is to include for all rough cutting, and fitting and bonding of brickwork with stonework." The foregoing where ashlar or stone dressings form a part of the work.

"The red brick facings are all in small quantities to strings, quoins, reveals, &c., and in parts may be considered as nearly equal to rubbed and gauged work; the moulded courses are all in red bricks, the girth of same has been measured and included in the superficial quantity of facings. A considerable part of the moulded work is in short lengths, and all to include the extra labour in oversailing." "The brickwork of projections is measured and included in general brickwork."

"The price for facings to include the bonding of the different kinds of facings with each other."

"The moulded bricks to be of the usual stock patterns, but of perfect and true shape."

If the moulded bricks for strings, &c., cannot be obtained from the manufacturer's stock, insert the following: "All the moulded courses to be cut and rubbed to detail."

*Terra-cotta.*—Where the quantity is small it will be sufficient to put the items into the bricklayer's bill; where a large quantity, make a separate bill of it; a description may be easily produced from the following clauses:—

Where the quantity is large it is the custom of some surveyors to arrange this work in two sections, one for "fixing only," which would be a part of the contract for the building; the other for the "manufacture and delivery," which would be a separate contract; but it is a better course to throw the whole responsiblity upon the builder.

It should be remarked that no work requires a more stringent and careful *specification* than terra-cotta, but only those parts of the subject are dealt with in the following clauses which immediately affect the value of the work.

The preamble to each section should contain such conditions as follow:—

*If for fixing only.*—"The manufacturer to receive any necessary assistance from the contractor in setting out the terra-cotta, and to allow for the necessary workshops for the use of the modeller to an extent to be approved by the architect."

"The manufacturer will deliver the terra-cotta on the site," but the contractor to unpack it.

"The terra-cotta to be delivered on the site free from damage; any piece of it which may be damaged for want of protection during the progress of the building shall be removed by the contractor, and replaced by a perfect piece at the contractor's expense."

"The contractor shall make any objection that he may wish to make to any portion of the terra-cotta within ten days of its delivery at the building."

"The terra-cotta shall be thoroughly bonded with and course with the brickwork; to include all cutting, fitting, and bonding of brickwork therewith; and no joint shall exceed one quarter of an inch in thickness. The jointing to be in accordance with the detail drawings to be supplied. None of the original surfaces to be filed, rubbed, or chipped, unless they are to be concealed, and these surfaces are to be as little interfered with as may be." The chambers of the terra-cotta to be filled in with fine concrete (state its composition, and whether lime or cement concrete, or cement and sand, and its proportions). "Each piece of terra-cotta to be thoroughly soaked with water before the filling in of the chambers, and the brickwork and terra-cotta in connection therewith to be thoroughly flushed in with mortar."

"The terra-cotta to be set in fine mortar, neatly pointed as the work proceeds, cleaned down at completion, and left perfect." (Describe any peculiarities as to pointing.)

"All the vertical and horizontal arrises to be left exactly true and regular."

*If for Manufacture and Delivery of Terra-cotta only.*—"The whole of the terra-cotta to be thoroughly burned, of uniform colour, free from cracks or other defects, the arrises sharp and true, the enriched work clean and sharp, and the whole equal in finish to the original models. All jointed in accordance with the detail drawings and chambered as required, but so as in no place to leave a less thickness than 2 inches. The mortises, joggles, grooves, perforations, &c., to be prepared on each piece before the burning, and each piece to be so prepared as to require no filing, rubbing, or chipping after the firing. The whole to be equal in colour, truth of line, and finish to samples, which are to be deposited with the architect before signing of contract."

"The terra-cotta is to be delivered on the site at the manufacturer's expense, and to be unpacked by the contractor, but the manufacturer shall be responsible for any damage that may occur to it before the unpacking."

Although the terra-cotta may be a separate estimate, general contractor should have a copy of the bills for reference.

"The manufacturer shall set out the work with the contractor's assistance, and they shall together arrange, as shall be necessary for the identification of the pieces of terra-cotta, but the manufacturer shall be responsible for the allowance for shrinkage and for the accuracy of the size of each finished piece, and shall mark each piece as arranged with the contractor."

"The models will be prepared for the manufacturer's use, but he shall perform all packing and carriage of them from the building to his works."

"The whole of the terra-cotta shall be delivered between . . day of . . . and . . . day of . . . and the rate of delivery shall be in a regular proportion to the quantity, and the time commencing on the first mentioned day."

"If the manufacturer shall fail to deliver the terra-cotta at the stipulated rate, he shall pay or allow to the employers as and by way of liquidated or agreed damages, the sum of £ . . . per week for every week during which the building shall be delayed in consequence thereof."

"Any part of the work which shall prove defective between the date of its delivery and the end of six months after the completion of the building, shall be removed and reinstated at the manufacturer's expense."

*Payments.*—(Repeat the clause as to payments to be found in the preliminary bill.)

"Any alteration in the works is not to vitiate the contract, but is to be valued in accordance with the original estimate, and for this purpose a priced copy of quantities is to be deposited with the architect."

*Models for Terra-cotta.*—When the contractor prepares his own models, a clause should follow the quantities of terra-cotta in the bill. Thus, after the plain and moulded terra-cotta, "the foregoing quantity of terra-cotta will involve the preparation of (number) different models or moulds which are to be supplied by contractor." After the enriched terra-cotta, "the foregoing quantity of terra-cotta will involve the preparation of (number) different models or moulds *which are to be supplied by the contractor" ;* or if a provision has been made for the models of enriched work, say, "to be supplied *by Messrs.* . . . , and for which a sum is provided."

*Concrete Buildings.*—Describe materials.

"The prices to include all the necessary apparatus, centres, moulds, &c., required, and allow for fixing, altering, removing, and making good after, and for building in all plugs, timbers, ends of stone, &c., as required."

*Mason.*—"The stone to be the best quality of its kind, free from vents, beds, sandholes, and all other imperfections, finished with a finely rubbed (or dragged) face, set on its natural bed in fine mortar (or cement), cleaned down at completion, and left perfect."

"Every stone to hold its full length and height square tc the back."

"Any stone which may be injured during the erection of the building shall be removed and replaced by the contractor at his own expense."

(It is sometimes provided that any stone injured shall be replaced, or the full cost of replacement deducted from the amount due to the contractor.)

"The Yorkshire stone described to be rubbed to have the rubbing completed on the premises, and the arrises left perfect."

"All the mouldings to be worked to zinc moulds." Observe that any special point affecting any particular kind of stone should appear in the preamble, as when any particular bed is desired, as the "Scott" bed in Tisbury stone, or when it is necessary that the stone should be from any particular quarry, as the Waycroft for Portland stone, Parkspring or Spinkwell for Yorkshire stone, &c.

"The stone is measured net as set, and is to include sawing and waste."

*When a Separate Contract for Granite.*—"The granite to be equal to samples to be deposited with the architect, to be prepared in all respects ready for setting, each piece to be numbered or otherwise marked so as to indicate its position, and the price to include packing and carriage and delivery on the works. The contractor for the general works will unload and fix the granite, and any loss incurred in adapting the stones to fit their intended position to be deducted from any amount due on this contract."

*Tiler.*—No preamble.

At end of bill,

"Allow for cleaning out gutters and leaving all roofs perfect and weatherproof at completion."

*Slater.*—No preamble.

At end of bill,

"Allow for cleaning out gutters and leaving all roofs perfect and weatherproof at completion."

*Carpenter.*—"The timber is to be of the best description, from Memel or Riga (or Dantzic), sawn die square, free from sap, shakes, large, loose, or dead knots, and all other defects, and sawn into scantlings immediately after signature of contract."

"The teak to be the best Moulmein."

"The oak to be of English growth, of the best quality and well seasoned" or (Dantzic oak).

(The whole of the specified or figured dimensions of timbers to be the finished sizes when fixed in the building.) See Carpenter: Modes of Measurement. Sometimes: "No allowance for waste has been made in these quantities."

When the proposed work is in one of the northern counties, it is advisable to say, "the prices for cube fir to include all labour and nails in framing and fixing," in which case labour and nails need not be measured separately.

*Joiner.*—"All the materials to be sound and well seasoned, free from shakes, loose or dead knots, and all other defects."

"The deals to be the best yellow Christiania or Onega."

"The teak to be the best Moulmein."

"The wainscot oak to be the best Memel."

"The mahogany to be the best quality of its kind, of good figure, and carefully prepared for French polishing."

"The American walnut to be of the best quality and even grain."

"All glued joints are to be cross-tongued."

"The whole of the works, except floors and skirtings, is to be wrought both sides, unless otherwise described."

("The dimensions and thicknesses figured and measured in the bill of quantities to be the finished sizes when fixed.") *See Joiner:* Modes of Measurement.

'The pitch pine intended for varnishing to be of good ure, carefully selected, and as far as possible secretly ed."

Sometimes the following:—"If the joints of the flooring en $\frac{1}{16}$th of an inch before the payment of final balance, the oring shall be taken up and relaid at contractor's expense."

The floors to be covered thickly with dry sawdust after ing until completion.

"The flooring and joinery over all pipes and bell-wires to fitted to remove and screwed with brass cups and screws.

*Ironmonger.*—"The ironmongery to be of the best quality d strongest description, all to be fixed with screws, the asswork with brass screws."

Sometimes "all the locks to be subject to one mastership, d to have two master keys to pass." All the lock furure to be . . . patent.

*Plumber.*—"To include all solder joints, wall hooks, &c., cessary to the completion of works."

"The water supply to be executed to the satisfaction of e water company's inspector."

"All pipes above 1½ inch diameter to have tacks."

All pipes to weigh the following weights per yard lineal lbs.:—

| | ½ in., | ¾ in., | 1 in., | 1¼ in., | 1½ in., | 2 in. |
|---|---|---|---|---|---|---|
| Strong | " | " | " | " | " | " |
| Middling | " | " | " | " | " | " |

(fill in weights for he various sizes).

At end of bill,

"Allow for paying fees for connection with main including ew ferrule, and for leaving the whole of the plumber's rk in perfect order and working condition, and for making od roads and footways to the satisfaction of the local thorities."

*Plasterer.*—"The sand to be clean and sharp (free from t, clay, and other impurities), and washed if required."

"The lime to be (describe); that for the setting coat n into putty at least one month before it is required for e;" or, "The lime to be selenitic used in accordance with e company's *instructions.*"

"The laths to be lath and half, rent out of the best red Baltic wood, butted at joints, the joints frequently broken, and nailed with wrought-iron nails."

"The hair to be the best long back hair, well beaten, and used in such proportions as the architect shall direct."

"The Portland cement" (describe as in preamble to Bricklayer).

"The Martin's (or Parian or Keene's) cement to be on backings of coarse Martin's cement" (or Portland).

When cornices have been measured net girth, "the cornices have been measured the net girth of the moulding; no allowance has been made for screeds."

At end of bill,

"Allow for cutting out all blisters, and for making good any defects with plaster of Paris."

*Founder and Smith.*—"All the cast and wrought iron to be of the best quality, and to include smith's work in fixing, and all other tradesmen's work herein described."

Or, "The wrought iron to be equal in quality to the best Staffordshire, and capable of bearing a tensile strain of 22 tons per square inch of sectional area before fracture, and a cross-strain of 11 tons without permanent set."

"All the bolts to have Whitworth threads, of full diameter, and nuts to fit perfectly."

"The ironwork shall be subjected to a test not exceeding half the breaking weight at the contractor's expense, and the contractor shall replace any defective piece of ironwork with new."

Some surveyors insert, "The cast iron has been calculated at 38 lbs. and the wrought iron at 40 lbs. per foot superficial of an inch thick"; this is not recommended, the better way is to calculate at the proper weight.

Or, "The quantities are all to include the cost of proving, hoisting, and all fixing complete excepting where otherwise described."

Testing being expensive, the word proving should not be inserted unless it is intended to carry it out.

*Gasfitter.*—"The pipes to be Russell's patent wrought-iron welded tubing, with all necessary tees, bends, angles, and connections, and jointed in red-lead cement."

"All the gasfitting to be done to the satisfaction of the gas company's inspector and to be left perfect."

At end of bill,

"Pay fees to gas company for connecting with main, and allow for all attendances, and for making good road and footways to the satisfaction of the local authorities." In good work add, "all floor boards and other joinery over pipes to be fitted to remove, with brass screws and cups."

*Bellhanger.*—"The bells to be . . . oz. bells (averaged) of varied tone, hung with best well-stretched copper wire in concealed zinc or copper tubing, with steel springs, cranks, pendulums and indicators, and with iron boxes and mouthpieces for the pulls."

*Zincworker.* — "To include all soldering, nailing ends to rolls, &c., required."

*Glazier.*—"All the glass to be the best of its respective kind, free from all bubbles, scratches, and other defects, cut to fit the rebates, carefully bedded, puttied and back puttied, and sprigged where required."

The British polished plate to be of best glazing quality and about ¼ inch thick, all edges to be blacked.

If there are lead lights, "allow for supplying the necessary templates for the lead glazing."

At end of bill,

"Allow for leaving glass clean and perfect at completion."

*Paperhanger.*—"All the walls to be carefully prepared to receive paper."

"All the paper to be hung with butt joints."

*Painter.*—"The materials to be of the best quality."

"The oil colours to be made with the best old white lead and pure linseed oil, and to be mixed on the premises."

"The varnish to be Mander's best copal."

"The stain to be Stephen's No. —. Stain let down with water to the required tint, and laid on with two brushes," or "The stain to be oil stain of approved tint, and as last."

The work to be well rubbed down and faced up between each two coats of colour. The old paint work, where cracked or blistered, to be burnt off or otherwise removed bare to the wood; and in such cases allow for knotting, priming, stopping, and painting one oil in addition to the work taken in this bill.

At end of bill,

"Allow for touching up work at completion and for leaving all perfect."

*Separate Estimates.*—When it is desired that the prices of certain parts of the work should appear separately in the tender, all the items of that work in all trades will form a separate bill, the items arranged in the same order as in a general estimate, and carried to the summary. As to whether it shall be added to the general total or not will depend upon the form of tender.

*Alternative Estimates.*—When an alternative price it required, as, for instance, for the execution of a roof in fir instead of oak, the roof must be measured first as of oak, and billed with the general estimate, and an alternative bill produced in some such form as follows, and written on double-columned bill paper:—

No. —. ALTERNATIVE ESTIMATE FOR ROOF OF NORTH AISLE IN FIR.

| ft. | in. | | | | Fir selected and left clean for staining. | Oak as in Bill 2, folio 8. |
|---|---|---|---|---|---|---|
| | | | | | £ s. d. | £ s. d. |
| 150 | 0 | Cube | Framed in trussed rafters pinned with oak pins .. | | | |
| 100 | 0 | ,, | Ditto in roof trusses, and ditto .. .. .. .. .. | | | |
| 500 | 0 | Sup. | Labour to planing .. .. | | | |
| 600 | 0 | Run | Labour to chamfer, 1½ in. wide stopped .. .. .. | | | |
| | | | No. 90 splayed stops .. .. | | | |
| | | | No. 40 labour to heads of bolts let in and pelleted.. | | | |
| | | | Value in oak .. .. .. | | £ | |
| | | | Deduct value if in fir .. | £ | | |
| | | | Amount of reduction carried to form of tender | | £ | |

The prices for the fir will be filled into the first column, and the prices for the oak repeated from the general bill in the second column.

*Schedule of Prices.*—As the contract which does not involve day work is an exceptional one, it will be always advisable to have a schedule of prices annexed to the form of tender. The general form is as follows:—

### SCHEDULE FOR LABOUR PRICES IN DAY ACCOUNTS.

| | |
|---|---|
| Excavator | Per hour |
| Bricklayer | " |
| Ditto Labourer | " |
| Mason | " |
| Ditto Labourer | " |
| Slater or Tiler | " |
| Ditto Labourer | " |
| Slate Mason | " |
| Ditto Labourer | " |
| Carpenter | " |
| Ditto Labourer | " |
| Joiner | " |
| Plumber | " |
| Ditto Labourer | " |
| Plasterer | " |
| Ditto Labourer | " |
| Ditto Boy | " |
| Smith | " |
| Ditto Labourer | " |
| Gasfitter and Bellhanger | " |
| Ditto ditto Labourer | " |
| Glazier | " |
| Painter | " |
| Horse, Cart, and Man | Per day. |
| Two Horses, Cart, and Man | " |

"NOTE.—The above prices, and prices for day work generally, to include use of scaffold and all tackle, tools, tool sharpening, water, and general foreman's time. Subordinate foremen to be charged as ordinary workmen. Time for fixing and removing scaffolds will be allowed."

*Summary.*—A convenient form for the summary is as follows:—

### SUMMARY.

| | | | | £ | s | d |
|---|---|---|---|---|---|---|
| No. | 1 | Preliminary and Provisions .. .. | | | | |
| " | 2 | Excavator and Drains .. .. .. | | | | |
| " | 3 | Bricklayer .. .. .. .. .. .. | | | | |
| " | 4 | Mason .. .. .. .. .. .. .. | | | | |
| " | 5 | Slater and Slate Mason (or Tiler) .. | | | | |
| " | 6 | Carpenter .. .. .. .. .. .. | | | | |
| " | 7 | Joiner and Ironmonger .. .. .. | | | | |
| " | 8 | Plumber and Zincworker .. .. .. | | | | |
| " | 9 | Plasterer .. .. .. .. .. .. | | | | |
| " | 0 | Founder and Smith .. .. .. .. | | | | |
| " | 1 | Gasfitter .. .. .. .. .. .. | | | | |
| " | 2 | Bellhanger .. .. .. .. .. .. | | | | |
| " | 3 | Glazier .. .. .. .. .. .. .. | | | | |
| " | 14 | Paperhanger .. .. .. .. .. | | | | |
| " | 5 | Painter .. .. .. .. .. .. .. | | | | |
| " | 6 | Separate Estimate (Boundary Walls, or as the case may be) .. .. .. | | | | |
| | | | £ | | | |
| | | Add for Surveyor's charges per cent. on the foregoing amount, to be paid on receipt of first instalment .. | | | | |
| | | Add for Lithography of Quantities and Expenses .. .. .. .. .. | | | | |
| | | Charge for preparing Bill of Credits | | | | |
| | | Carried to Tender (or Amount of Tender) .. .. .. .. .. | £ | | | |

Write at the bottom of summary the following clause Some surveyors write them also outside of summary.

"Tenders to be delivered on the form furnished herewith, at t architect's office, at or before 10 a.m. on Monday, d of

"The drawings and specification may be seen at the architect's after the 26th inst.

"The proprietor does not bind himself to accept the lowest or tender." Sometimes, "and reserves to himself the right to accept any of them."

*Form of Tender.*

For any work, unless of small size, it is advisable to b a form of tender prepared in some such form as follows :-

"Tender for the erection of house and offices at
"Godalming, Surrey, for John Smith, Esq."

"To William Brown, Esq.,
"Architect,
"2, Fenchurch Chambers, E.C.

"Sir,

"I am willing to contract for and perform the whole of the works required to be done in the erection of a house and offices at Godalming, Surrey, for John Smith, Esq., according to the drawings and specification and general conditions prepared by you for that purpose, and to your entire satisfaction, for the sum of pounds."

Where several items are required to be stated, it should run thus, "for the undermentioned sums."

"For £
"For £
"or the whole for the sum of £

"If the joinery be executed in deal, as per alternative estimate, Bill No. 17, I am willing to reduce the last-mentioned amount by the sum of pounds."

"And I am also willing to allow a deduction of pounds for the old materials as per Bill No. 20 credits."

"And I am also willing to execute any day works at the prices for labour in the schedule attached hereto."

"And I also agree to sign the contract when called upon to do so within a month (or as case may be) from the date hereof.

"As witness hand this day of , 1880.

"Signature ______________________.
"Address ____________ ____________."

*Credits Bill.*—There are several methods of preparing a credits bill. One way is to commence with a clause.

No. 20 Credits.

"Take down, remove, and give credit for the whole of the following materials, after allowing for the expense of taking down and removing and clearing away rubbish; the whole of the old materials (except lead) as are sound and approved, may be re-used in the new work."

Then the items should follow, in the order of the trades, stating their position in the manner before suggested in the remarks upon preliminary bill. According to this arrangement the total will be carried to the summary, where it will appear as—"Deduct Credits, Bill No. 20."

Another way is when no separation has been made between those items of alteration which involve a credit and those which do not. The bill of alterations is prepared in the usual way, and the items which involve a credit are marked with the word Credit in red ink in the margin of the bill, thus:—

> "Take down and remove cross on gable of north porch and prepare original apex stone to receive new one."
>
> (In foregoing item the old stone is assumed to be useless.)
>
> "Credit." "Take down, remove, and credit the roof of north porch, comprising about two squares of timbers and boarding and 15 cwt. of old lead, and prepare old walls to receive new roof and make good all works disturbed."

According to this arrangement an item appears in the summary as follows:—

Credit by value of old materials marked Credit in red on margin of Bill No. 3.

Another method is to prepare a bill with double columns, as on next page.

No. 20. PULL DOWN AND CREDIT.

| | | | | | Pull Down. | | | Credit. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| rds. | ft. | | sup. | | £ | s. | d. | £ | s. | d. |
| | | | | "The old bricks so far as they are sound and approved may be used, but no bats or broken bricks will be allowed to be used." | | | | | | |
| | | | | (State any other materials that may be re-used.) | | | | | | |
| | | | | "No other portion of the old materials to be used, but to be removed immediately after pulling down." | | | | | | |
| 3 | | | | Clean and stack old bricks for re-use, basket, and cart away rubbish. | | | | | | |
| yds.<br>42 | | | " | Brick-nogged partition .. | | | | | | |
| 20 | | | | Brick paving in stables .. | | | | | | |
| | 50 | | run | York stone coping 13 in. wide .. .. .. .. .. | | | | | | |
| | 40 | | " | York stone coping 18 in. wide .. .. . .. .. | | | | | | |
| | | No. | | Flight of twelve York steps, and landing back area .. .. .. .. .. | | | | | | |

| | | | | Pull Down. | | | Credit. | | |
|---|---|---|---|---|---|---|---|---|---|
| qrs. | ft. | sup. | | £ | s. | d. | £ | s. | d. |
| 21 | | ” | Slating to main roof .. .. | | | | | | |
| | 30 | run. | Slate ridge roof .. .. | | | | | | |
| 10 | | sup. | Roof timbers and slating battens .. .. .. .. .. .. | | | | | | |
| 10 | | ” | Old floor and joists .. .. | | | | | | |
| 10 | | ” | 4-in. fir framed partition | | | | | | |
| | | 1 | Door and frame and linings back entrance .. .. | | | | | | |
| | | 3 | Sets of sashes and frames in western wall of larder .. | | | | | | |
| | | | The staircase from third to fourth floor, consisting of twenty steps, with handrail and balusters to one side. | | | | | | |
| ’ds. | | | | | | | | | |
| .00 | | sup. | Knock off plastering of old walls, and basket and cart away rubbish .. .. | | | | | | |
| .00 | | ” | Knock off lathing and plastering to partitions, and basket and cart away rubbish .. .. .. .. .. | | | | | | |
| 00 | | ” | Knock down old ceiling, and basket and cart away rubbish .. .. .. .. .. .. | | | | | | |
| | | | Hot plate and hot closet in kitchen. | | | | | | |
| wt. | | | Range in kitchen .. .. | | | | | | |
| 20 | | | Old lead .. .. .. .. .. | | | | | | |
| | | | The w.c. pan and trap, first floor w.c., and all soil and supply pipes connected therewith. | | | | | | |
| | | | Total for pulling down carried to preliminary bill, page 3 .. .. .. | £ | | | | | |
| | | | Total of credits to be carried to summary, and amount to be stated in tender .. .. .. .. | | | | £ | | |

r this arrangement.

In the preliminary bill a clause will appear:—

“Allow for pulling down, see Bill No. 20.”

And in the summary a clause:—

“Deduct Credits, see Bill No. 20.”

Special cases will arise requiring modifications of either of the foregoing methods.

Probably the client obtains a larger sum for the credits if the amount appears in the tender.

In billing works where there is more than one trade involved, as in a bill headed Zincworker, in which there is joinery, write a preliminary clause to this effect, "include also joiner's work herein described," or carpenter's or other tradesman's work, as the case may be. Write "continued" opposite every total carried forward, and "carried to summary" to the total at end of each trade.

Put a tick at the bottom of each column of abstract when it is billed, in the same manner as suggested for the bottom of columns of dimensions.

When the draft bill is finished read it carefully through, and take care to understand every item. Observe that the words "cube," "superficial," "run," "No.," "continued," "carried to summary," are in their proper places. It is a good plan to emphasize these changes by leaving a blank line between cubes and superficials, &c. See that every trade is numbered and *in the summary*. If you are pressed for time, and equal attention cannot be given to every item, take particular notice of the larger or more valuable items, as it is in these that errors will be of the most importance. Always do this, however confident you may be of the carefulness of the checking.

It will save much time in altering and correcting the lithographed copies of the bills if the surveyor reads (or causes to be read) the transfers (i.e. the lithographer's copy on paper prepared for transfer to the stones) as soon as they are ready, making corrections where the lithographer has made mistakes. It will be necessary to keep a list of them, and when the lithographed copies are received to see if the mistakes have been rectified. As all the copies are alike, this will be necessary only with respect to one of them.

Count the copies to see that they agree with the lithographer's invoice. Fill in the charges to the summary, and count the number of bills in each set before they are despatched.

If errors are discovered after the bills are sent out, an addenda bill must be prepared and sent to the builders, but avoid this necessity if possible.

It is well to remember the function of a bill of quantities and that it is not a specification, it need never indicate position of work in a building except when the value of the item is affected thereby. The position of material, and the manner in which it has been measured, can be seen by referring to the dimensions, a copy of which should be supplied to the builder, but not until he applies for it.

In some parts of the kingdom it is customary to combine the quantities and specification, making the bill of quantities serve for both. It is maintained by some that this can be done with less labour than the preparation of the two separate documents involves. The principle is to append to each item a statement of its position in the building.

If tenders are advertised for and no quantities supplied, the selection of the builder may be deferred until after tenders are received, and there is no obligation to accept the lowest tender.

But where quantities are supplied, a selection is made before their issue, from the persons offering to tender, and in such cases it is usual to adopt the lowest, the inference being that the eligibility of all was considered before sending to them. The result of the tender will be best if care is taken to select men who do the same class of work.

## FORM OF A BILL.

### Heading.

### "No. 1. PRELIMINARY AND PROVISIONS."

| yds. | ft. | in. | supl. | | £ | s. | d |
|---|---|---|---|---|---|---|---|
| | | | | Contract conditions which affect the cost .. .. .. .. .. .. .. | | | |
| | | | | Preliminary works .. .. .. .. | | | |
| | | | | Items of alteration sometimes separately billed as "works on spot," thus: | | | |
| | | | | "All the cutting of openings to include removing and carting away rubbish and any needling or shoring" .. .. .. .. .. .. | | | |
| | | | | "The making good after cutting of openings to be in hard stocks and cement, and the arches to include centering" .. .. .. .. .. .. | | | |
| | | | | "Allow for cutting opening 3′ 0″ × 7′ 0″ in 1½-brick wall for inserting lintel and pads elsewhere taken for making good brickwork around and for making good plastering on both sides after fixing joinery" .. | | | |
| | | | | "Allow for cutting two openings 4′ 0″ × 9′ 9″ in 1½-brick wall for inserting semicircular arches in two rings, and making good brickwork" .. .. .. .. .. .. .. | | | |
| | | | | "Allow for cutting opening 2′ 9″ × 2′ 0″ in 2-brick wall, for inserting stone lintel (elsewhere taken), and making good brickwork" .. .. | | | |
| | | | | *Provisions.* | | | |
| | | | | Preamble. | | | |
| | | | | Provide for stoves £50 .. .. .. | | | |
| | | | | Do. for chimneypieces and fixing £50 .. .. .. .. .. .. | | | |
| | | | | Do. for 850 yards of tile paving and fixing £400 .. .. .. .. | | | |
| | | | | Carried to summary .. .. | £ | | |
| | | | | No. 2. EXCAVATOR AND DRAINS. | | | |
| | | | | Preamble. | | | |
| 100 | 0 | 0 | „ | Excavation to surface trenches and carting away .. .. .. .. .. | | | |
| | | | | Continued | £ | | |

### Excavator and Drains—*continued.*

| ds. | ft. | in. | supl. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| 00 | 0 | 0 | ” | Ditto, a small part filled in and rammed, and ditto .. .. .. .. | | | |
| | | | | Follow with any varieties of excavation. | | | |
| 00 | 0 | 0 | ” | Excavation, 12" deep (averaged) to general surface and carting away | | | |
| 00 | 0 | 0 | cube | Concrete as described, in trenches, including staging .. .. .. .. .. | | | |
| 00 | 0 | 0 | supl. | Ditto, 6" thick, levelled to receive pavings .. .. .. .. .. .. | | | |
| 00 | 0 | 0 | ” | Ditto, 9" thick, to falls .. .. .. | | | |
| 00 | 0 | 0 | ” | Ditto, 9" thick (averaged), and filling in over arches 12 feet above street level .. .. .. .. .. | | | |
| | | | | Concrete of various kinds other than foregoing, as lias lime or cement, cube and supl., as arrangement of lime concrete. | | | |
| | 50 | 0 | run | Strutting and planking to sides of excavation, 9 feet deep .. .. .. | | | |
| | 50 | 0 | ” | Ditto to b trenches, 4 feet wide and 6 feet deep, one face measured for two .. .. .. .. .. .. .. | | | |
| | | | | *Drains.* | | | |
| | | | | General description of drains. | | | |
| | 100 | 0 | ” | 4" drain and 2 feet excavation, averaged .. .. .. .. .. .. .. .. | | | |
| | 100 | 0 | ” | 4" ditto 4 feet ditto .. .. .. | | | |
| | | | | Follow with the various sizes and depths. | | | |
| | | No. | 10 | Extra for 4" bends .. .. .. .. .. | | | |
| | | ” | 10 | Ditto, 6" ditto .. .. .. .. .. .. | | | |
| | | | | Follow with junctions, double junctions, taper pieces, &c., in the same manner. | | | |
| | | | | Ends of rain-water pipes and other pipes made good to drain, cesspools, grease traps, rain-water tanks, &c. .. .. .. .. .. | | | |
| | | | | Connection with sewer and pay fees | | | |
| | | | | Carried to summary .. .. | £ | | |
| | | | | No. 3. **Waller and Bricklayer.** | | | |
| | | | | Preamble. | | | |
| 00 | 0 | 0 | cube | Rubble walling in mortar in random courses, with one through stone | | | |
| | | | | Continued | £ | | |

**Waller and Bricklayer**—*continued.*

| yds. | ft. | in. | supl. | | £ | s. |
|---|---|---|---|---|---|---|
| | | | | 18″ × 12″ on bed to every superficial yard .. .. .. .. .. .. | | |
| 100 | 0 | 0 | ,, | Ditto, in 14″ walls, fair one side .. | | |
| 100 | 0 | 0 | ,, | Ditto, in 10″ walls, fair both sides.. | | |
| | 100 | 0 | ,, | Raking rough cutting on rubble .. | | |
| | 100 | 0 | ,, | Extra labour building 14″ wall, battering 1″ to a foot rise .. .. | | |
| | 1000 | 0 | ,, | Extra on rubble walling for local stone facing, as described, on roughly dressed courses 4″ to 6″ deep, well bonded to the work behind, and with one through stone 14″ on bed to each superficial yard set in mortar, and the joints raked out and pointed with black ash mortar .. .. .. .. | | |
| | | | | Lineal labours on rubble, numbers to rubble, as ends cut and pinned, extra for arches, &c. .. .. .. | | |
| | 100 | 0 | ,, | Extra on rubble walling for half brick internal lining with 2″ cavity between same and rubble, carefully keep clean from droppings of mortar and rubbish, and including bonding across 2 feet apart, and every sixth course in height with Jennings' patent No. 5 stoneware bonding bricks, and allow for leaving openings at bottom of hollow for properly cleaning out same, and filling up the openings at completion.. .. | | |
| | | | | Follow with other extras in brick on the rubble—supls., runs, numbers. | | |
| rods | | | | | | |
| 100 | 50 | 0 | ,, | Reduced brickwork in mortar .. | | |
| | | | | Ditto of various kinds in mortar .. | | |
| | | | | Ditto, extra only in cement .. .. | | |
| | | | | Half brick partitions, brick-nogging, tile arches, &c. .. .. .. .. | | |
| | | | | Rough cutting, limewhiting .. .. | | |
| | | | | Damp-proof course .. .. .. .. | | |
| | | | | Pavings of cement, bricks, tiles, asphalte .. .. .. .. .. .. .. | | |
| | | | | Wall-tiling .. .. .. .. .. .. .. | | |
| | 100 | 0 | run | Labour rough oversail, one course.. | | |
| | 100 | 0 | ,, | Ditto rough chamfer on brick.. .. | | |
| | | | | Follow with cuttings to quoins, groin point chases, copings. | | |
| | | | | Continued .. | £ | |

## Waller and Bricklayer—*continued.*

| ft. | in. | run. | | £ | s. | d. |
|---|---|---|---|---|---|---|
| 105 | 0 | „ | $1\frac{1}{4}'' \times \frac{1}{16}''$ hoop iron and laying in walls by bricklayer, (weight 0 cwts. 3 qrs. 0 lbs.) .. .. .. | | | |
| | No. | 100 | Ends of timber cut and pinned .. | | | |
| | | | Follow with ends of various things cut and pinned. | | | |
| | | | Frames bedded and pointed, arches (all except gauged, see facings) and numbers generally; labour and materials, setting stoves, ranges, soot doors, air bricks, and such small metal articles as include labour by bricklayer .. .. .. | | | |
| | | | "Allow for bricklayer to attend upon bellhanger to No. ... bells with ... pulls" .. .. .. .. .. | | | |
| | | | *Facings.* | | | |
| | | | Description of facing *bricks* and pointing. | | | |
| 1000 | 0 | supl. | "Extra on common brickwork for facings of picked stocks finished with a neatly struck joint as the work proceeds" .. .. .. .. | | | |
| | | | Follow with the various kinds of facings according to value. | | | |
| | | | Rake out cement joints, pointing, gauged arches, diapers, &c. .. | | | |
| | | run | Labours on facings according to value .. .. .. .. .. .. | | | |
| | | | Follow with items of labour and materials, thus:— | | | |
| 100 | 0 | „ | Extra on facings for one course moulded bricks as string .. .. | | | |
| | | | No. 2. Mitres .. .. .. .. .. | | | |
| | | | „ 2. Returned and mitred ends | | | |
| 100 | 0 | „ | Extra on facings for eaves, cornice five courses high, one course oversailing and one course dogs-tooth, including setting out .. .. .. | | | |
| | | | No. 20 square angles .. .. .. | | | |
| | | | „ 20 irregular ditto .. .. .. | | | |
| | | | „ 20 ends splayed and fitted .. | | | |
| | | | Follow with Nos. . . . extra on facings thus:— | | | |
| | No. | | Labour cutting moulded string course, one course high for passage of rain-water pipe.. .. .. .. | | | |

Continued £

**Waller and Bricklayer—*continued.***

| cwts. | qrs. | lbs. | | | £ | s. |
|---|---|---|---|---|---|---|
| | | | | *Hoisting and Fixing only* (when the fixing is not included in smith's bill, or when the ironwork is in a provisional sum.) | | |
| 80 | 0 | 0 | In | 4 combination girders 30 feet above street level .. .. .. .. .. | | |
| 80 | 0 | 0 | „ | 5 ditto, 42 feet ditto .. .. .. | | |
| | | | | Carried to summary .. .. £ | | |

## No. 4. Mason.

| | ft. | in. | | | £ | s. |
|---|---|---|---|---|---|---|
| | | | | Preamble. | | |
| | | | | *Yorkshire Stone.* | | |
| | | | supl. | Tooled stone of various thicknesses, the thinnest first .. .. .. | | |
| | | | | Rubbed stone of various thicknesses, the thinnest first . .. .. | | |
| | | | | Lineal items of labour thus :— | | |
| | 100 | 0 | run | Labour to groove for iron tongue .. | | |
| | 100 | 0 | „ | Ditto tooled edge to 3″ .. .. .. .. | | |
| | | | | Lineal items of labour and material thus :— | | |
| | 100 | 0 | „ | 2″ × 4½″ tooled riser jointed both edges .. .. .. .. .. .. .. | | |
| | 100 | 0 | „ | 2″ × 8″ ditto .. .. .. .. .. .. .. | | |
| | | | | Follow with numbers of labour only, labour and materials, small metal articles fixed by mason. | | |
| | | | | *Portland Stone.* | | |
| | 100 | 0 | cube | Stone, including hoisting and setting | | |
| | 100 | 0 | „ | Ditto, in scantling lengths .. .. | | |
| | 100 | 0 | „ | Stone, including hoisting and setting from 40 to 60 ft. above street level | | |
| | | | | Or extra hoisting to stone from 40 to 60 ft. above street level .. .. | | |
| | | | | Follow with the various heights. | | |
| | | | | Follow with the labour on the cube stone supls., runs, numbers, thus :— | | |
| | 100 | 0 | supl. | Labour sawn back .. .. .. .. | | |
| | 100 | 0 | „ | Ditto beds and joints, one face measured for two .. .. .. .. .. | | |
| | 100 | 0 | „ | Ditto, ditto, sunk, ditto all measured .. .. .. .. .. .. | | |
| | | | | *Portland "Stone and all Labour."* | | |
| | | | | Supls., runs, numbers .. .. .. | | |
| | | | | Continued £ | | |

MASON—*continued.*

| ft. | in. | supl. | | £ | s. | d. |
|---|---|---|---|---|---|---|
| | | | Follow with cramps, dowels, and small metal articles fixed by mason. | | | |
| | | | Follow with the various kinds of stone, adopting the same arrangement as the foregoing. | | | |
| | | | "Allow for attending upon bell-hanger to No. . . . bells with No. . . . pulls" .. .. .. .. | | | |
| | | | *Bosting and Preparing for Carver in Portland Stone.* | | | |
| | | | Supls., runs, numbers .. .. .. | | | |
| | | | Often the carving is a provision. | | | |
| | | | Carried to summary .. .. | £ | | |
| | | | No. 5. SLATER AND SLATE MASON (OR TILER). | | | |
| 10 | 0 | „ | Best Bangor Countess slating, laid to a 2½" lap with two 1¼ copper nails, weight 8 lbs. per thousand to each slate .. .. .. .. .. | | | |
| | | | Follow with the supls. various kinds of slating. | | | |
| | | | Follow with runs and numbers. | | | |
| | | | Clause for cleaning out gutters, &c. | | | |
| | | | *Slate Mason.* | | | |
| | | | Supls., runs, numbers .. .. .. | | | |
| | | | Small metal articles fixed by slate mason .. .. .. .. .. .. .. | | | |
| | | | Carried to summary .. .. | £ | | |
| | | | No. 6. CARPENTER. | | | |
| | | | Preamble. | | | |
| 100 | 0 | cube | Fir in plates, lintels and wood bricks .. .. .. .. .. .. | | | |
| 100 | 0 | „ | Ditto, fitted to iron .. .. .. .. .. | | | |
| 100 | 0 | „ | Fir in ground joints .. .. .. .. | | | |
| 100 | 0 | „ | Fir framed in floors .. .. .. .. | | | |
| | | | Follow with the various descriptions of unwrought fir according to value. | | | |
| | | | Continued | £ | | |

CARPENTER—*continued.*

| sqrs. | ft. | in. | supl. | | £ |
|---|---|---|---|---|---|
| | | | | Follow with the wrought fir, arranged in the same manner as above. | |
| | | | | Hoisting and fixing roof trusses .. | |
| | | | | Follow with centering, supls., runs, numbers. | |
| | | | | Gradling, bracketting .. .. .. | |
| | | | | Strutting to stone lintels, strutting and ribbing to traceried windows | |
| | | | | Follow with general supls., runs, numbers. | |
| | | | | Fixing only ironwork, numbers according to value, but these items will only occur when fixing is not included in smith's bill, and in such case make a note in smith's bill that fixing is in carpenter's bill. | |
| | | | | Carried to summary .. .. | |
| | | | | **No. 7. JOINER AND IRONMONGER.** | |
| | | | | Preamble. | |
| | | | | "*Floors in Deal.*" | |
| 100 | 5 | 0 | " | In order of value, commonest first. | |
| | 50 | 0 | " | 1¼" yellow batten floor, laid straight joint with splayed headings and mitred borders to hearths, punched, puttied and traversed and cleaned off at completion .. .. | |
| | | | | Ditto, in small quantities and bearers .. .. .. .. .. .. | |
| | | | | Follow with extras on floors, as grooves and nosings, &c. | |
| | | | | Follow with floors in pitch pine, floors in oak, &c., arranged in a similar manner. | |
| | | | | Each division as floors, skirtings, doors, &c., may be followed by the similar categories in superior wood. | |
| | | | | *Skirtings in Deal, including backings where required.* | |
| | | | | In order of value, the least value first. | |
| | | | | Continued | £ |

### Joiner and Ironmonger—*continued.*

| ft. | in. | run. | | £ | s. | d. |
|---|---|---|---|---|---|---|
| 100 | 0 | „ | ½" × 4" chamfered skirting, including mitres, housings, and returned ends .. .. .. .. | | | |
| 100 | 0 | „ | 1" × 7" moulded skirting .. .. | | | |
| | | | No. 20 mitres .. .. .. .. .. | | | |
| | | | „ 10 housings .. .. .. .. | | | |
| | | | *Fanlights, Skylights, Sashes, and Frames in Deal.* | | | |
| | | | Fanlights, skylights, casements, according to thickness. Sashes and frames thus:— | | | |
| 100 | 0 | supl. | 1½" moulded fixed fanlight .. .. | | | |
| 100 | 0 | „ | 2" moulded casements in single squares hung on butts .. .. .. | | | |
| 100 | 0 | „ | Deal cased frames of 1" inside and outside linings, 1¼" pulley stiles, ½" back linings, all rebated and grooved together, 3½" teak double-sunk weathered and check-throated sills, and 2" moulded sashes in single squares, double hung with best brass axle pulleys, best flax lines and iron weights, the frame grooved all around for finishings in No. 5 complete frames .. .. | | | |
| | | | Lineal quantities of extra labour on sashes and frames, and nos. thus:— | | | |
| 100 | 0 | run | Labour splay-rebated and grooved bottom rail to 2" sashes .. .. | | | |
| 100 | 0 | „ | Ditto splay-rebated meeting rail to ditto .. .. .. .. .. .. .. | | | |
| | No. | 100 | Moulded horns to 2" sashes .. .. | | | |
| | | 100 | Ditto 2¼" ditto .. .. .. .. .. | | | |
| | | | Small casements and frames or small sashes and frames, thus:— | | | |
| | | No. 1 | 1½" ovolo, moulded casement hung on butts (elsewhere taken) in and including 4½" × 3" wrought frame rebated, chamfered, and beaded, and 3" oak sunk and weathered sill, 2′ 9" × 2′ 3" extreme dimensions. .. .. .. .. .. .. .. | | | |
| | | | *Doors in Deal.* | | | |
| 11 | 0 | supl. | 1½" one-panel square-framed dwarf cupboard .. .. .. .. .. | | | |
| 100 | 0 | „ | 1½" four-panel moulded both sides | | | |
| | | | Continued | £ | | |

JOINER AND IRONMONGER—*continued.*

| ft. | in. | supl. | | £ | s. |
|---|---|---|---|---|---|
| 100 | 0 | „ | 2″ three-panel, the two lower panels square framed, the upper with diminished stiles, and prepared with moulded bars in small squares, with and including beads for glass .. .. .. .. .. .. | | |
| | | | The various thicknesses according to value. | | |
| | | | Extra labours on doors, runs and numbers, thus:— | | |
| 100 | 0 | run | Labour hook rebated and moulded meeting rail to 2″ doors .. .. | | |
| | No. | 100 | Doors prepared with double tenons for mortise locks .. .. .. | | |
| | | | *Thicknesses and Framings in Deal.* | | |
| | | | Commencing with the least thickness, thus:— | | |
| 100 | 0 | supl. | ¾″ drawer, sides dovetailed .. .. | | |
| 100 | 0 | „ | 1″ lining, tongued at angles .. .. | | |
| 8 | 0 | „ | 1″ soffits tongued at angles and with splayed ends .. .. .. | | |
| 100 | 0 | „ | 1¼″ cistern enclosure, square framed | | |
| | | | This division includes framings, as partitions, window backs, cupboard fronts and supl. items which do not come into the other sections. | | |
| | | | "Fir framed and wrought all round where required" (sometimes "all framed in white lead)." | | |
| | | | Posts, frames, door frames, according to scantling, the smallest first, irrespective of the quantity of labour on them, thus:— | | |
| 100 | 0 | run | 3″ × 1½″ frame wrought, moulded 6″ girth and plugged .. .. .. | | |
| 100 | 0 | „ | 3½″ × 4½″ ditto rebated and twice narrow chamfered .. .. .. .. | | |
| 100 | 0 | „ | 3½″ × 6″ transome twice rebated and four times moulded 2″ girth | | |
| | | | *Architraves and Mouldings in Deal.* | | |
| | | | According to scantling, the smallest first, thus:— | | |
| 100 | 0 | „ | 1″ × 2½″ fillet rebated and hollow moulded .. .. .. .. .. .. | | |
| 100 | 0 | „ | 1″ × 3″ ditto plugged .. .. .. | | |
| | | | No. 20 fitted ends .. .. .. .. | | |
| | | | „ 10 returned mitred ends .. .. | | |
| | | | Continued | | |

## Joiner and Ironmonger—*continued.*

| | in. | run. | | £ | s. | d. |
|---|---|---|---|---|---|---|
| | | | *Sundries in Deal.* | | | |
| ft. | in. | | Runs and numbers, labours, labour, and material, thus, according to value. | | | |
| 100 | 0 | ,, | Labour groove .. .. .. .. .. | | | |
| 100 | 0 | ,, | ,, notching 1¼" .. .. .. | | | |
| 100 | 0 | ,, | ,, stopped hollow for 2¼" swing doors .. .. .. .. .. .. | | | |
| 100 | 0 | ,, | ½" screwed fillet wrought .. .. | | | |
| 100 | 0 | ,, | ¾" return lining wrought, and side rebated both edges .. .. .. | | | |
| 100 | 0 | ,, | 1" × 3" grounds, wrought, framed and splayed .. .. .. .. .. | | | |
| | No. | 100 | Labour splayed ends to moulding, average 20" girth .. .. .. .. | | | |
| | ,, | 100 | Mortises for saddle bars .. .. .. | | | |
| | ,, | 100 | Heads of screws let into deal and pelletted .. .. .. .. .. .. .. | | | |
| | | | *Attendances.* | | | |
| | | | Joiner attend plumber to | | | |
| | ,, | 2 | Baths .. .. .. .. .. .. .. .. | | | |
| | ,, | 2 | Sinks .. .. .. .. .. .. .. .. | | | |
| | ,, | 2 | W.c.'s .. .. .. .. .. .. .. .. | | | |
| | ,, | 2 | Cisterns .. .. .. .. .. .. .. | | | |
| | | | Joiner attend bellhanger, cutting away and making good after him to No. 13 bells with No. 13 pulls, and include the necessary boards for bell runners and for fixing the floor boards and joinery over same to remove with brass cups and screws .. .. .. .. .. .. .. | | | |
| | | | *Staircases in Deal.* | | | |
| | | | Items in the usual order supls., runs, numbers, thus:— | | | |
| 100 | 0 | supl. | 1¼" landing cross-tongued and bearers .. .. .. .. .. .. .. | | | |
| 100 | 0 | ,, | 1¼" treads with rounded nosings, with small moulding rebated and let in beneath, and 1" risers rebated and screwed together, glued. blocked and bracketted on, and including strong fir carriages, and prepared for close strings .. | | | |
| 100 | 0 | ,, | 1¼" ditto, but winders cross-tongued and measured net .. .. .. | | | |
| | | | Continued .. .. | £ | | |

### Joiner and Ironmonger—*continued.*

| ft. | in. | | | £ |
|---|---|---|---|---|
| 100 | 0 | run. | Extra on 1¼" floor for nosing with small moulding rebated and let in beneath, and grooved and tongued to edge of floor .. .. .. .. | |
| | No. | 100 | 2" turned balusters housed to wainscot-handrail and housed and dovetailed to deal floor, with moulded stops (eight in all) on cap and base of each .. .. .. | |
| | | | *Staircases in Pitch Pine* (or other superior wood). | |
| | | | Supls., runs, numbers .. .. .. | |
| | | | Honduras Mahogany (including French polishing and carefully protecting until completion of works). | |
| | | | (Or the French polishing in painter's bill). | |
| | | | Supls., runs, numbers, thus:— | |
| 100 | 0 | supl. | 1" w.c. seat and deal framed bearers | |
| 100 | 0 | „ | 1¼" back and elbows, moulded one panel high .. .. .. .. .. .. | |
| 100 | 0 | run. | Labour groove in 1¼" stopped, including stops .. .. .. .. .. .. | |
| 100 | 0 | „ | 1" × 1¼" bed moulding rebated one edge .. .. .. .. .. .. .. | |
| | | | No. 20 mitres .. .. .. .. .. .. | |
| | No. | 1 | Labour small quadrant corner to 1¼" | |
| | „ | 3 | Holes cut and chamfered for handles | |
| | „ | 3 | Extra for w.c. seats and risers, fitted to remove easily with oak button blocks and brass cups and screws | |

Wainscot, oak, teak, American walnut, or other superior woods follow in order of their value, keeping each wood distinct.

Ironmongery of the best quality and strongest description, all to be fixed with screws, the brass-work with brass screws.

*To Deal.*

Of the various articles begin with the smallest; the following is the recognised order of arrangement.

Iron butts, brass butts, iron back flaps, brass back flaps, iron hinges, brass hinges, iron bolts, brass bolts, iron

Continued £

JOINER AND IRONMONGER—*continued.*

| | | | | £ | s. | d. |
|---|---|---|---|---|---|---|
| | | | latches, brass latches, iron locks, brass locks, sets of door furniture (where separately taken), window furniture, finger plates, general ironmongery, sets of lines and pulleys, general brasswork, thus:— | | | |
| | No. | 9 | Pairs 2½″ wrought butts .. .. .. | | | |
| | " | 9 | " 3″ ditto .. .. .. .. .. | | | |
| | " | 9 | " 2½″ brass butts .. .. .. | | | |
| | " | 9 | " 3″ ditto .. .. .. .. .. | | | |
| | " | 6 | " 15″ cross garnet hinges .. .. | | | |
| | " | 5 | 6″ tower bolts .. .. .. .. .. | | | |
| | " | 6 | 8″ barrel bolts .. .. .. .. .. | | | |
| | " | 5 | 6″ brass barrel bolts .. .. .. .. | | | |
| | | | *Ironmongery and fixing to mahogany.* Same arrangement as for deal. | | | |
| | | | Carried to summary .. .. £ | | | |
| | | | NO. 8. PLUMBER AND ZINCWORKER. | | | |
| | | | *Externally.* | | | |
| qrs. | lbs. | | Preamble. | | | |
| 2 | 7 | | Milled lead and labour in gutters, flats, and flashings .. .. .. | | | |
| 0 | 0 | | Ditto in stepped flashings .. .. | | | |
| | | | Follow with leadwork of various kinds, such as are reduced to weight. | | | |
| ft. | in. | | Follow with labours on the foregoing lead. | | | |
| 100 | 0 | run | Labour scalloped edge to 7 lbs. lead .. | | | |
| 100 | 0 | " | Lead wedging to flashings .. .. | | | |
| 100 | 0 | " | Ditto stepped ditto .. .. .. .. | | | |
| 100 | 0 | " | Close copper nailing .. .. .. .. | | | |
| | | | *Internally.* | | | |
| qrs. | lbs. | | Preamble. | | | |
| 0 | 0 | | Milled lead and labour in covering to draining boards .. .. .. .. | | | |
| 0 | 0 | | Ditto in linings to sinks and safes .. | | | |
| ft. | in. | | Follow with labours, soldered angle, copper railings, middling pipes, according to size, thus:— | | | |
| 100 | 0 | run | ¾″ middling lead pipe, including bends, joints, and fixing .. .. | | | |
| 100 | 0 | " | 1″ ditto .. .. .. .. .. .. | | | |
| | | | Continued £ | | | |

## PLUMBER AND ZINCWORKER—*continued.*

| yds. | ft. | in. | supl. |  | £ | s. |
|---|---|---|---|---|---|---|
|  |  |  |  | Strong lead pipe in a similar manner. |  |  |
|  |  |  |  | Iron pipe, copper pipe, and any extra labours on it in usual order of runs and numbers. |  |  |
|  |  |  |  | Soldered joints in order of size, soldered ends .. .. .. .. .. .. |  |  |
|  |  |  |  | Short lengths of pipe, traps, brasswork, lavatories, w.c. apparatus, baths, urinals, cisterns .. .. .. .. |  |  |
|  |  |  |  | Clause as to Water Company and fees. |  |  |
|  |  |  |  | *Zincworker.* |  |  |
|  |  |  |  | Supls., runs, numbers .. .. .. |  |  |
|  |  |  |  | Carried to summary .. .. | £ |  |
|  |  |  |  | No. 9. PLASTERER. |  |  |
|  |  |  |  | Preamble. |  |  |
|  |  |  |  | *Internally.* |  |  |
|  |  |  |  | Distempering, colouring, pugging .. |  |  |
|  |  |  |  | General plastering according to value, thus :— |  |  |
| 100 | 0 | 0 | ,, | Render and set walls .. .. .. |  |  |
| 100 | 0 | 0 | ,, | Render, float, and set ditto .. .. |  |  |
| 100 | 0 | 0 | ,, | Lath, plaster, float, and set partitions |  |  |
| 100 | 0 | 0 | ,, | Ditto ceilings .. .. .. .. .. |  |  |
|  |  |  |  | *Work in fine Plaster.* |  |  |
|  |  |  |  | Supls., runs, numbers, thus:— |  |  |
|  | 100 | 0 | ,, | Moulded cornice .. .. .. .. |  |  |
|  | 100 | 0 | run | Ditto, 6″ girth .. .. .. .. .. |  |  |
|  |  |  |  | No. 50 mitres .. .. .. .. .. |  |  |
|  | 100 | 0 | ,, | Moulded cornice, 9″ girth .. .. |  |  |
|  |  |  |  | No. 50 mitres .. .. .. .. .. |  |  |
|  |  |  |  | ,, 50 returned mitred ends .. .. |  |  |
|  |  | No. | 300 | Mitres to moulding 18″ girth (averaged) .. .. .. .. .. .. |  |  |
|  |  |  |  | *Work in Portland Cement.* |  |  |
|  |  |  |  | Supls., runs, numbers .. .. .. |  |  |
|  |  |  |  | Follow with work in other cements, keeping each cement separate and in same order as last. |  |  |
|  |  |  |  | Sometimes wall tiling is billed here. |  |  |
|  |  |  |  | Continued | £ |  |

No. 9. Plasterer—*continued.*

| wts | qrs. | lbs. | | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| | | | | *Externally.* | | | |
| | | | | In the same order as internal plastering. | | | |
| | | | | Allow for cutting out blisters, &c. .. | | | |
| | | | | Carried to summary .. .. £ | | | |
| | | | | No. 10. Founder and Smith. | | | |
| | | | | Preamble. | | | |
| | | | | *Cast Iron.* | | | |
| | | | | The various kinds of articles, weight and description, the pattern following each item, thus:— | | | |
| 40 | 2 | 0 | | In No. 6 hollow columns and hoisting and fixing at various levels .. | | | |
| | | | | No. 1. Pattern for hollow column with moulded base and necking and four brackets, 8 ft. high in all .. .. .. .. .. .. | | | |
| | 0 | 0 | | No. 3. Alterations to ditto .. .. | | | |
| 50 | | | | In four stanchions, and hoisting and fixing as before .. .. .. .. | | | |
| | | | | No. 1. Pattern to stanchion of (figure) \|——\| section, with square cap and base and stiffeners .. .. .. | | | |
| | | | | Follow with runs (as eaves gutters, rain-water pipes, &c.) and numbers, in the latter case the patterns may often be included with description, thus:— | | | |
| | ft. | in. | | | | | |
| | 100 | 0 | run | Macfarlane's No. 2, 3″ × 4″ rain-water pipes fixed with bands, elsewhere taken, and fixing by bricklayer .. .. .. .. .. .. | | | |
| | | | | No. 6 shoes .. .. .. .. .. .. | | | |
| | | | | " 2 plinth bends .. .. .. .. | | | |
| | | | | " 1 swan-neck 4½″ projection .. | | | |
| | | | | " 1 ditto 9″ ditto .. .. .. .. | | | |
| | | | | 22 Macfarlane's No. 44 bands to ditto, and fixing with and including oak plugs to brick facings .. .. | | | |
| | | No. | 10 | Corbels to match *a* (see sketch in mason's bill) 1′ 6″ × 2′ 2″ × 1′ 9″ of 1¼″ iron, with four 1½″ × 1½″ | | | |
| | | | | Continued £ | | | |

## FOUNDER AND SMITH—*continued.*

| cwts. | qrs. | lbs. | | | £ | s. |
|---|---|---|---|---|---|---|
| | | | | wrought lugs 14″ long turned up and down for building in, including pattern and fixing by bricklayer .. | | |
| | | | | *Wrought Iron.* | | |
| 40 | 0 | 0 | | In two riveted girders with angle irons and stiffeners, and hoisting and fixing by smith and bricklayer 12 ft. above street level .. .. | | |
| 20 | 0 | 0 | | In rolled joists cut to exact lengths, and hoisting and fixing at various levels by bricklayer .. .. .. | | |
| 20 | 0 | 0 | | In flitch plates 12″ deep, including perforations and fixing by carpenter .. .. .. .. .. .. | | |
| | | | | Follow with iron in chimney bars, framed gratings, &c. | | |
| | | | | Follow with runs and numbers. | | |
| | | | | Carried to summary .. .. | £ | |

### No. 11. GASFITTER.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Preamble. | | |
| | f. | in. | | Pipe according to size, thus :— | | |
| | 100 | 0 | run | ½″ pipe, as described .. .. .. | | |
| | 100 | 0 | " | ¾″ ditto .. .. .. .. .. .. | | |
| | | | | Fittings according to value, but often a provisional sum .. .. .. .. | | |
| | | | | Lengths of pipe, main cock, syphon, meter, clause as to fees, &c... .. | | |
| | | | | Carried to summary .. .. | £ | |

### No. 12. BELLHANGER.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | No. | 13 | Bells with fifteen pulls .. .. .. | | |
| | | | | " *Fixing only.*" | | |
| | | " | 6 | Ceiling pulls .. .. .. .. .. | | |
| | | " | 4 | Lever pulls .. .. .. .. .. | | |
| | | " | 3 | Box pulls .. .. .. .. .. .. | | |
| | | " | 2 | Sunk plate pulls, including letting into brickwork and making good | | |
| | | | | The foregoing arrangement will involve a provision for the pulls, always the more satisfactory way. | | |
| | | | | Carried to summary .. .. | £ | |

### No. 13. GLAZIER.

| ft. | in. | supl. | | £ | s. |
|---|---|---|---|---|---|
| | | | Preamble. | | |
| 300 | 0 | „ | 21 oz. sheet glass, not exceeding 2ft. in a square, and glazing .. .. | | |
| 300 | 0 | „ | 21 oz. ditto, 3 ft. ditto. .. .. .. | | |
| 300 | 0 | „ | 21 oz. ditto, 2 ft., cut to shapes and ditto .. .. .. .. .. .. | | |
| | | | Follow with the various qualities of glass in a similar manner. | | |
| | | „ | Embossing or enamelling plate glass P.C., per foot .. .. .. .. .. .. | | |
| | | „ | Lead lights and glazing .. .. .. | | |
| | | | Copper clips and brass screws .. | | |
| | | | Allow for leaving glass clean and perfect at completion .. .. .. | | |
| | | | Carried to summary .. .. | £ | |

### No. 14. PAPERHANGER.

| | | | | | |
|---|---|---|---|---|---|
| | | | Preamble. | | |
| | No. | | Pieces of paper P.C., 3*s.* per piece, and add for hanging .. .. .. | | |
| | | | Follow with other paper according to value. | | |
| | No. | | Pieces of paper, extra for sizing and twice varnishing with best paper varnish .. .. .. .. .. .. | | |
| | | | Carried to summary .. .. | £ | |

### No. 15. PAINTER.

| yds. | ft. | | | | |
|---|---|---|---|---|---|
| | | | Preamble. | | |
| 100 | 0 | supl. | *Two oils on iron* .. .. .. .. | | |
| | 100 | run. | Bar and rail .. .. .. .. .. .. | | |
| | | | Follow with the various kinds of painting according to value and in the usual order to each. | | |
| | | supl. | *Extra for graining oak and twice varnishing with the best copal varnish.* .. .. .. .. .. .. | | |
| | | | Follow with runs and numbers .. | | |
| | | | Allow for touching up, &c. .. .. | | |
| | | | Carried to summary .. .. | £ | |

The usual endorsement of a bill is similar to the following:—

" Estimate,
" House and Offices,
" Godalming, Surrey
" For John Smith, Es

" *July*, 1878."

" Mason "
(or " All Trades.")

(Autograph) " John Green,
" Surveyor,
" 8, Westminster Chambe
" S.W.

When two Surveyors are employed both should sign.

## CHAPTER V.

### RESTORATIONS.

These relate generally to churches, and a statement of the common practice with respect to them will apply fairly well to all works of repair.

The extent to which the general directions of the specification will be enforced depends so much upon the ideas of the architect that work executed from the same specification under one man's supervision may cost 500*l.* and under another's 1000*l.*; and although the surveyor should adopt his share of responsibility, he should avoid taking more than his share, and in measuring the work he should, while giving the quantity, throw the decision as to its extent in other respects upon the builder.

The materials removed will be treated in the manner described in the remarks on credits.

The new work will be measured in the usual way.

The stonework will be described as in windows or doorways, or as the case may be, and as bonded with old work if such is the case.

The cutting away to insert new windows or doorways, item by item, stating thickness of wall and size of new opening, and that it includes making good to new stonework, and in what trades, and state in what part of the building.

A clause will usually be found, "*Cut out all decayed parts of general facing, make good with new, and point with mortar* (*or cement*)." In such a case use the words of the specification, and measure the whole area occupied by the facing.

In the case of worked stone give the *superficial* area, where possible, of stonework to be repaired, and state the nature of the repair.

Measure at per foot run, repairs to strings, quoi
copings.

Number repairs to windows, doorways, pinnacles, finia
&c.

The repairs to stonework are almost always described i
general way, and when this is the case the surveyor's descri
tion should also be general, so as to throw the interpre
tion on the contractor. Nevertheless when particular ston
are described to be replaced with new, they may be measur
as for new work, but state that they are inserted.

As it is usually uncertain how much will be spent in su
a work, it will generally be required to keep the work
different sections, so that they may be separately stated in t
tender, as "works to tower," "works to south chapel," &
putting under each head the work in all trades relating to t
particular section.

Alternative estimates for oak and pitch pine or de
&c., are frequently required. See remarks on alternati
estimates.

In cases where it is impossible to measure the work b
forehand it is fairest to provide such a sum of money
quantity of material as may in the opinion of the survey
be necessary, adjusting the quantity at the settlement
accounts.

A few instances of the method of treatment of various ite
relating to the old work are as follows. The new work wi
be treated in the usual way.

| | |
|---|---|
| | "Remove and credit. The roof of north side ai comprising two trusses, about three squares boarding and roof timbers, and about 18 cwt. of lead, and make good work disturbed by removal." |
| yds. ft. in.<br>" 1000 0 0 supl. | Cut out all decayed parts of general facing, make g with new to match old, and point with cement." |
| sqrs. ft. in.<br>" 6 0 0 ,, | Take up and credit paving of nave and aisles, a remove earth for a depth of 6 inches to receive c crete, and deposit within a distance of two run (or cart away). |

| | |
|---|---|
| yds. ft. in.<br>“1000 0 0 supl. | Remove plaster, limewhite, &c., from the walls, and general stonework, repair the stonework with stone of the same kind inserted in cement, and point the joints with fine mortar, and clear away rubbish.” |
| ft. in.<br>“1000 0 run. | Examine, clean, and repair splayed plinths of nave and aisles and chancel, cutting out all decayed stones and inserting new where necessary to match old.” |
| ft. in.<br>“50 0 „ | Cut out remains of old stone string 6 inches high and insert new (elsewhere taken), and make good (chancel).” |
| “No. 8. | Examine and repair pinnacles of tower, cutting out decayed stones and inserting new as required.” |
| | “Examine and repair eastern window of chancel, cutting out decayed stones and inserting new, remove glazing and saddle bars, and make good.” |
| | “Remove glazing and saddle bars of western window, north aisle, cut out the tracery of head, and prepare to receive new (elsewhere taken), remove wooden mullion and restore with new stone to match old, repair the remainder of stonework, and make good all works disturbed.” |

The general conditions and preliminary items of the bill will be as for new work.

There are few points specially to be observed in a bill of restoration, and the following should appear in the preliminary bill :—

“Any objects of interest which may be found during the progress of the works to become the property of the committee.”

“Carefully case and protect from injury the mural tablets and monuments (enumerating and describing them), where necessary to remove them for the purposes of this work, place them in a safe position and refix them at completion, and make good around same, and contractor is to be responsible for and make good any damage that may occur to them during the progress of the works.”

Or the foregoing clause may be made to include only those monuments which remain in position, and those removed treated something like the following :—

“Take down and deposit and protect the monument on north wall of north aisle, refix when the wall is rebuilt, and make good all work around same."

"Carefully take up the footstones, brasses, slabs, &c., in floor of nave, deposit and protect and refix same in such positions as may be directed, as follows." Enumerate them.

"Remove the gravestones or tombs which may interfere with the rebuilding of north aisle, deposit and protect and refix same, as follows." Enumerate them, or give the number of large and small ones.

"Allow for the removal and reinterment where directed by the churchwardens of any bodies that may be met with in course of excavation."

Provide a certain quantity of concrete for the filling in of any old graves that may be met with.

In measuring the plastering on the old walls take care to state "that it is to include any necessary dubbing."

In measuring new glazing in old stonework take a running dimension of "clean out or rework, rebate, or groove for lead lights, and fill in old mortises."

Let the general items of pulling down and cutting new openings, &c., follow the conditions and general preliminary items.

Where any of the work is to match old, state it.

*General Alterations.*—It may be instructive to present here a few types of items which are of frequent occurrence in a bill of alterations, and which may serve to show their general treatment.

| | £ | s. | d. |
|---|---|---|---|
| "Allow for closing up the bottoms of No. 20 flues while raising the shafts for clearing away rubbish, and sweeping and coring the flues at completion" .. .. .. .. .. | | | |
| "Allow for cutting opening for doorway 3' 0" × 7' 0" in 1½-brick wall, for inserting new lintel (elsewhere taken) and relieving arch, for making good brickwork in cement, and for making good plastering after fixing of finishings, flooring, and all other works disturbed on south side of drawing-room" .. | | | |

In case of openings cut the item will appear as above, and the lintel and finishings will be measured and treated as is usual with new work.

| | £ s. d. |
|---|---|
| "Allow for taking down doors of library and dining-room (three in all), taking off the ironmongery and making good after same, for nailing and glueing on pieces to heads where out of square, and for rehanging in new linings, elsewhere taken" .. .. .. | |

In the cases of adapting old joinery it will generally be necessary to take off all the old ironmongery and substitute new. The new ironmongery will be taken in the usual way.

| rods ft. | | | £ s. d. |
|---|---|---|---|
| 5 0 | supl. | Reduced brickwork in cement in small quantities inserted, and including cutting and bonding to old work .. .. .. .. .. | |

In the case of openings filled in, measure the brickwork (the net opening) described as in last item.

Observe that cases are frequent in which the actual amout of pulling down desired and indicated on the drawings cannot be adhered to, as it would often cost more to support the work than to pull it all down and rebuild it, notably in cutting openings in old walls.

| ft. | | | £ s. d. |
|---|---|---|---|
| 90 | supl. | "Cut back face of old wall to form toothing, and insert new brickwork in cement and bond same to old wall" .. .. .. .. .. | |
| 20 | " | "Cut down projection of 1-brick chimney breast to old wall and prepare same for new work" | |
| 100 | run. | Cut chase in old walls about 5″ × 5″ rough, render same in cement, and insert and bond new walls to old, including additional brickwork .. .. .. .. .. .. .. .. .. | |
| 100 | supl. | Old selected paving (taken from present basement) re-squared, re-tooled on upper face, laid in mortar, and jointed in cement .. .. | |
| 100 | cube. | "Fir framed joists inserted in small quantities" | |
| 100 | " | "Fir framed in quarter partition ditto" .. .. | |
| yds. | | | |
| 100 0 | supl. | Hack face of old walls and prepare for new plastering .. .. .. .. .. .. .. .. | |
| 100 | run. | Make good junction of new and old plastering | |

### *Variations before acceptance of Tender.*

After a tender has been delivered it is often found nec sary to reduce it. There are various ways of doing this. reduce the cubic content, the quality of the materials, t extent of the finishings.

The surveyor will, as a general rule, be asked to furnis list of proposed alterations with each item priced.

The prices per foot cube being calculated from the amou of tender and the cubic content at the commencement of t dimensions, the amount of saving effected may be eas arrived at. It should, however, be observed that the redu tion of the height of the stories, or of the width of a buildi will not produce a reduction so great as the number of cu feet would seem to indicate. Whereas the omission of a p of the length of a building, or a part of it where r walls, floors, and finishings are all comprised, will correspo pretty accurately with the price per foot cube of the buildi as first projected.

Parts of the work which are not susceptible of cubic cal lation, as covered ways, boundary walls, &c., will be omit by reference to the dimensions; and it is in the case of va tions that the advantage of their suggested separation in t dimensions is apparent.

As the result of these calculations will be reported to t client, and are but an approximate estimate, the amount omissions had better be reduced by 10 per cent. and additions increased by 10 per cent., as in the more care preparation afterwards of the bill of additions and omissi it will inevitably happen that some differences will be ma The trouble and expense of a detailed calculation of ite which may not be ultimately adopted will thus be saved. list of the proposed variations should be supplied to t architect to submit to his client; but neither the item alteration nor their estimated value should be communica to the builder, as cases have been known (though, happ rare) of the builder reducing in his copy of the quantities prices of the items proposed to be omitted.

When it has been decided what shall be omitted the original dimensions must be carefully looked through, and the items affected copied as a fresh set of dimensions; where a series of dimensions as originally taken is to be omitted they may be referred to in the new dimensions by letters A, B, C, &c., putting the same letter at the beginning and end of each series in the original dimensions; thus:—

| | | | |
|---|---|---|---|
| A | 20·0<br>10·0 | 200·0 | L. P. F. and S. ceiling and twice whiten.<br>B. R. 3. |
| | 14·0<br>14·0 | 196·0 | add<br>B. R. 4. |
| A | | | |

The reference in the new dimensions being as follows:—

*Omit* A to A, col. 40, ceilings B. R. 3 and 4. Sometimes it may be necessary to omit a part only, as for instance one door out of five, in such case the note would be "Omit $\frac{1}{5}$th A to A col. 40, one door." Always describe in your new dimensions what the omission is, as otherwise you will be unable to distinguish without again referring to the original dimensions.

Single dimensions may sometimes be transferred as follows, the equivalent of the squaring being written in the dimension column:—

| | | | | |
|---|---|---|---|---|
| 2/ | 12 6 | | 102 1 | |
| | 4 1 | 102 1 | 1 0 | 102 1 |

In copying dimensions for the purpose of omitting them begin the series with the word *omit*, and then copy them verbatim, additions and deductions, just as originally taken. Be careful when you measure the additions to head that series with the word *additions*.

In abstracting your omissions and additions it will occasionally be found that there is an item of deduction with nothing of the kind from which it can be deducted.

In such cases transfer all deductions of addition sheet omission sheet as omissions.

Transfer all deductions of omission sheet to addition sh as additions.

When the bill of variations is complete, the builder shou produce his original estimate, and he and the survey together should affix the prices to each item, those to t omissions to be at the rate of the original estimate, those the additions at analogous rates.

## CHAPTER VI.

### ERRORS, ETC., IN ESTIMATES—SCHEDULE OF PRICES—ADJUSTMENT OF ACCOUNTS.

As a builder has sometimes been known to deliver a very low tender (perhaps several hundreds of pounds lower than the next above him), and has afterwards professed that he has made a mistake in his estimate to his own damage, it is perhaps not superfluous to consider the question of errors generally. In such a case as the foregoing the surveyor should request the builder to allow an examination of his original estimate, when he can generally form an opinion as to the genuineness of the plea. Where he has reason to suspect deceit, the whole of the builders originally tendering should have an opportunity of revising their tenders. Where the plea is a true one the case may generally be met by giving the builder a part of the difference, but after the contract is signed no claim for errors should be allowed.

Where a priced estimate is deposited, the rates of which are to be applied to items of variations, the moneying out of the bill should be carefully checked, as where a money item does not agree with its rate, as follows:—

| | ft. | in. | | | *s.* | | | |
|---|---|---|---|---|---|---|---|---|
| | 100 | 0 | cube | Fir framed in roof. | 3 | 10 | 0 | 0 |

The rate must be assumed in accord with the result, viz. 2*s.* per cubic foot.

Mistakes in the casting of columns will also affect the prices in a similar manner; for instance, the amount of the tender being 10,000*l.* and the true result of the casts being 10,500*l.*, the rates would be subject to a deduction of 5 per cent., as all parties are bound by the amount of tend Observe also whether a deduction has been made of a certa percentage from the amount in summary to produce t amount of tender; if so, the rates may also be subjected t deduction of that percentage, but it is sometimes so small to be not worth the trouble. This percentage allowan should not be applied to provisional amounts.

## SCHEDULES OF PRICES.

In cases where it is desired to commence a building a there is not time for the preparation of an estimate in t usual way it is a frequent practice to prepare a schedule prices. Often the work of basement only is done by schedu the drawings for the superstructure being completed duri its progress. In such a case the surveyor carefully exami the drawings, and where there is a specification that al or if a specification has not been prepared, he arranges t quality of the work with the architect. A schedule is th drawn up, commencing with conditions, and comprisi every item which the surveyor (from the information possesses) considers will be required. The preamble to ea trade should set forth any special conditions as to, or mo of, measurement, if any. A copy is then forwarded to ea builder, who prices the schedule and returns it to the arc tect, who then, by careful comparison and analysis of prices, decides upon the person he will accept.

It may be perhaps considered superfluous to caution surveyor against the adding of the whole of the prices each schedule together and comparing the results, but as t has been done, and is no test of the respective tenders, it necessary to direct attention to it.

A proper analysis should be made, in the follow manner:—

The surveyor should cube the building, and form opinion as to its probable cost. He will then be able judge of the extent of the main items of material and lab which will be required, as, so many rods of brickwork, so many feet of stone, so many feet of sashes and frames, &c.; and if this cannot be arrived at otherwise they may be roughly measured from the drawings, the approximate quantity being sufficient for the purpose.

The builders having seen the drawings, it will sometimes be found from an inspection of the schedules that an attempt has been made to entrap the unwary surveyor, by putting specially low prices to some of the items of which there will be but a small quantity used, as for masonry in a building for the most part of brick, for slating where of the roof covering the greater part is tiling, &c., thus producing a semblance of a low schedule.

The analysis may be conducted thus, assuming quantities as follows:—Ignore the shillings and pence if under ten shillings, if as much as ten shillings call it one pound. The labour prices may be averaged by adding together all the trades, as, excavator 7*d.*, bricklayer 11*d.*, mason 11*d.* = 9$\frac{2}{3}$ average.

| | Smith. | | | | Brown. | | | | Jones. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | £ | £ | s. | d. | £ | £ | s. | d. | £ |
| 2000 yards excavation and carting .. .. | | 3 | 6 | 350 | | 3 | 6 | 350 | | 4 | 0 | 400 |
| 1000 yards concrete | | 7 | 0 | 350 | | 6 | 6 | 325 | | 7 | 6 | 375 |
| 40 rods brickwork .. | 14 | 0 | 0 | 560 | 15 | 0 | 0 | 600 | 16 | 0 | 0 | 640 |
| 1000 ft. fir .. .. | | 2 | 9 | 138 | | 2 | 7 | 129 | | 3 | 0 | 150 |
| 100 squares flooring. | 1 | 10 | 0 | 150 | 1 | 8 | 0 | 140 | 1 | 9 | 0 | 145 |
| Daywork, 1000 hours | | | 9 | 38 | | | 10 | 42 | | | 9½ | 40 |
| Total .. .. .. | | | | £1586 | | | | £1586 | | | | £1750 |

The surveyor, when called upon to report, should state whose schedule is lowest, and by what percentage the remainder exceed him, and also that, "assuming that the building should cost so much (state sum), Smith's price would be (state sum), Brown's (state sum), Jones's (state sum)."

The form the schedule should take is generally indicated below the items in the order in which they would appear.

"*Conditions of tender and schedule of prices on which proposed to erect (describe building and its position, name of proprietor).*"

"John Smith, Esq., Architect,
"March, 1878." "2, Fenchurch Chambers, E

When no drawings have been prepared, a general des tion of the intended building, and its dimensions, shoul given.

"The carcase of the building is to be completed and ro in by (date), and completed by (date), or in case of fulfilment of such works by either date the contracto forfeit as liquidated damages the sum of £ . . . per Delay consequent upon strikes only excepted."

"If at any time the architect is dissatisfied with progress making with the works, as regards time, contractor shall employ, at his direction, more workme their respective trades, or in case of the introductio improper or inferior materials or workmanship the tractor shall alter them as directed by the architect, an case the same be not done or altered within forty-eight h of written notice being given by him to the contractor, architect is hereby empowered to take the work out of hands of the contractor, and to employ such other builde he may think proper to complete the premises; and in event of the contractor becoming bankrupt, the archi after similar notice, shall have the same power."

"Payments will be made at the rate of . . . per cent. on value of the works executed, on the certificate of architect, in sums of not less than £ . . ., from time to t till a balance of £ . . . is accumulated as a reserve, and a that time the amounts of such values to be paid in full, the balance within one month after the architect shall h certified that the work contemplated under the schedu completed to his satisfaction, with the exception of £ to be retained for a longer period as hereinafter describe

"The proprietors retain for themselves the power of tracting with any other parties for fittings or separate portions of the work connected with the premises or for the completion of them at any stage they may think fit, and the contractor will be required to give every reasonable facility to such other contractors for carrying out their work."

"Should any unforeseen delay occur in carrying out the work (other than as herein alluded to) from causes not under the control of the contractor, it shall rest entirely with the architect to decide whether any and what pecuniary allowance shall be made to the contractor for such delay as respects the use of plant and scaffolding, or the waste of foreman's or other time, or loss of interest on capital, or from any other cause, but no allowance will be made for any rise in the general rate of wages or other prices during the continuance and till the completion of the works according to the above conditions, or during such additional time as may by any default of the contractor be requisite for the completion of them."

"The contractor alone will be held responsible for all injury to life or property caused by carrying out the works from whatever cause arising, and also for all damage to the proprietors of this or adjoining properties, of whatever kind, caused by the carelessness or inadvertence of his workmen."

"The decision of the architect shall be binding on the contractor and on (name of proprietor) in all matters relating to the contract as to the interpretation of the drawings and specification as to the quality of the materials and workmanship used, and as to any question which may arise in reference to the progress and conduct of the work, and as to the payment for the same."

"The whole of the materials and labour are to be of the best quality, and to be executed and completed in exact accordance with the drawings, details, specification, and instructions provided from time to time by (name of architect) or other the architect for the time being of the said (name of proprietor), and to his entire satisfaction."

"The works will be carried on under the supervision of a clerk of works, and every facility to be given to both the architect and his representatives for the full examinatio all work or labour, either before, during, or after t execution."

"The contractor will be required to keep a thorou competent foreman in constant attendance at the buildin his representative."

"The works to be executed by proper workmen at d wages, and none to be sub-let without the written conser the architect, the architect to have the power of dismis all workmen whom he may deem to have behaved improp or to be incompetent."

"It is intended that the whole of the work shall be for on measured prices, but should any works in alterat be required to be executed at day prices, weekly acco shall be sent in to the architect containing full particula the time and materials expended thereon, and the deli of such weekly accounts within ten days of the expiratio each week shall be a condition precedent to payment of week's work in any other manner than at the measured p hereinmentioned."

"The prices named are to include all labour and mate and the use of all tools, implements, scaffolding, ladders, machinery required for the proper execution of the whol

"The prices for ordinary workmen for day labour also include all time expended by the foreman engaged in superintendence of the same; unless he be engaged clusively upon the work so charged."

"The works to be carried out in strict accordance the Metropolitan Building Act, with the bye-laws of Commissioners of Sewers, and with all other regulation a public nature authorized by law."

(The foregoing in the metropolis. In the country local Act and the town surveyor will be mentioned.)

"The following works shall be executed by the contra as (*inter alia*) works necessary for carrying out the cont without any special payment for the same, but they be considered as part of his own expenses, which the pr to be obtained on the measured work will cover, viz. :—

"The giving of all requisite notices to (district surveyor and) all (other) authorities, and the furnishing of all particulars to such authorities." (Leave out words in parenthesis when not in metropolitan area.)

"The use of lines and stakes of all kinds in setting out the work, and all labour and superintendence thereon."

"The erection of an office for clerk of works, with all requisites for the same, together with all necessary firing and lighting for him during the progress of the works."

"The covering and protection of all walls from wet and frost on the occasion of any requisite suspension of the works."

"The covering and protection of all stone steps or protecting brick or stone work from injury during the progress of the works, and the removal of the same."

"All requisite temporary barricades or fences to doors or windows (exclusive of paper lights, if ordered by the clerk of works) and the requisite sheds or coverings to lime and facing bricks, &c."

"All plumber's work, &c., in temporary water storage or supply, and gas service and use of braziers (the water company's charge for water for the works and the cost of gas, as sanctioned by the clerk of works, and the cost of fuel for drying the rooms, but not the labour connected with any of these, will be allowed.)"

"The general attendance of each trade upon all others and the execution of all jobbing work and all requisite attendance and messages in connection with the superintendence of the same."

"The removal of rubbish and surplus materials as they accumulate, washing floors, if required, at completion, and leaving the whole premises in a neat and orderly condition."

"The contractor shall also, without further charge, keep in repair the whole of the work executed either at measured or day prices for a period of six months after the completion of the contract, during which period the sum of £ . . . shall be retained by (name of proprietor), and any defects appearing either in materials or workmanship shall be made good by the contractor at his expense."

"The work will be measured up from time to time Mr. . . . . . . . , of . . . . , surveyor, on behalf of parties, and will be priced by him at the rates of selected schedule, subject to a reference to the archi in case of any dispute arising as to the interpretation the schedule or the mode of its application."

"The surveyor's charges of 2½ per cent. and expense be divided equally between (name of proprietor) and contractor, and to be paid by the latter as the works ceed."

### SCHEDULE.

(*Note.*—Various items have been introduced to show convenient modes of treatment.)

"On all sums paid out of pocket for insurance fees and payment to local authorities, expense of water, of gas, to the extent sanctioned by clerk of works; of such fuel as may be used under the special instructions of the clerk of works for the purpose of drying the premises, on cost of tile paving, asphalting, ornamental glazing, stoves, chimneypieces, parqueterie, furniture, and fittings, &c. (except trade fittings); and of any other works executed by workmen other than those of the contractor, during the progress of the works, to include remuneration for the use of scaffolding, temporary protections and casings, extra lighting and watchings, and other necessary accommodation (except time actually expended in unloading and fixing) an allowance or addition on the net amount certified by the architect" of .. .. .. .. .. .. .. Per cent.

"*Note.*—Any of the above amounts which may be paid by the contractor will be paid in full to the contractor as part of the next certificate to him."

"In all cases P.C. values to be interpreted as the amounts paid by contractor after deducting trade allowances, but not ordinary discount for cash."

"For the construction, alteration, and maintenance of all requisite hoarding, fences, gangways, rails, kerbs, coverings to footways, temporary ways over vaults, gates, doors, fastenings, painted notice-boards, and all other matters required by local authorities or considered necessary by the architect, and for removal of same on net *frontage* of building" .. .. .. .. .. .. .. .. .. Per foot ru

| | |
|---|---|
| "*Use and waste* of timber in shoring to ground, or to buildings, and include cost of all wedges, hoop iron, &c., and labour complete" | Per foot cube. |
| "Oiled paper lights if specially ordered by the architect" | Per foot supl. |

Reference to a price book as you prepare your schedule will help to preserve you from omission of necessary items of labour and material.

### "*Excavator.*"

| | |
|---|---|
| Excavation at various depths and of various kinds | Per yard cube. |
| "Fill in and ram around foundations selected hard dry material from site, or dry rubbish" | " |
| "Fill in and wheel one run" | " |
| "Extra runs" | " |
| "Fill and cart away" | " |
| "Concrete (lime describe), including staging" | " |
| Concrete of various kinds and various thicknesses to follow here. | |
| "Clay puddle" | " |
| "Excavator" | Per hour. |
| "Gravel or ballast" | Per yard cube. |
| "Sand" | " |
| "Lime" (describe sort) of various sorts | " |
| "Portland cement" | Per bushel. |

### "*Drains.*"

| | |
|---|---|
| Describe fully. Give the various sizes and the depth of the digging | Per foot run. |
| "Extra for deep tunnelling." State average depth | " |

| | Bends. | Single Junctions. | Double Junctions. | Siphons | |
|---|---|---|---|---|---|
| "Extra on 4-inch drains for ' Follow with the various sizes, as 6-inch, 9-inch, &c. | | | | | Each. |

### "*Bricklayer.*"

Describe the materials generally, as preamble to a bill of quantities.

| | |
|---|---|
| The various kinds of brickwork | Per rod supl. |
| "Extra for hoisting above . . . feet" | " |
| "Add if in one brick walls *fair* both sides | " |

| | |
|---|---|
| "Add if circular on plan" .. .. .. .. .. .. .. | Per rod s |
| "Add if in vaulting" .. .. .. .. .. .. .. .. .. | „ |

Follow with the various items of brickwork, arranged as in a bricklayer's bill.

| | |
|---|---|
| "Hoisting and fixing iron columns, girders, and joists up to 20 feet above footway" .. .. .. .. .. .. .. | Per ton. |
| Follow with the various heights .. .. .. .. .. .. | „ |
| "Bricklayer" .. .. .. .. .. .. .. .. .. .. .. .. | Per hour. |
| "Labourer" .. .. .. .. .. .. .. .. .. .. .. .. | „ |

Various materials, as bricks per thousand, mortar per yard and hod, putty or fireclay per hod, &c.

"*Mason.*"

State clearly how the stone is to be measured.

Place the best stone first; assume in this case Portland stone.

| | |
|---|---|
| To commence with a description of the stone, state that "the prices are to include moulds, trammels, &c., and those for labour to include arrises. The stone to be measured net as set, including hoisting and setting not exceeding 40 feet from level of footway" .. .. .. | Per foot c |
| "Add, if exceeding 6 feet in length" .. .. .. .. .. | „ |
| "Add on first item, if exceeding 8 feet in length" .. | „ |
| "Add on ditto, &c., if hoisted from 40 feet to 60 feet from level of footway" .. .. .. .. .. .. .. .. .. | „ |

Follow with various heights.

Follow with labours arranged as in a bill of quantities.

| | |
|---|---|
| "On the net amount paid for carving, to reimburse contractor for all scaffolding and cleaning up after same, an addition of" .. .. .. .. .. .. .. .. .. .. .. | Per cent. |
| "Bath stone of description, as Portland stone" .. .. | Per foot c |
| "Allow off price of labour on Portland stone" .. .. | Per cent. |

Follow with the various stones with less labour in a like manner.

| | |
|---|---|
| "Sound hard Yorkshire stone, as above" .. .. .. | Per foot c |
| "Add to price of labour on Portland stone" .. .. | Per cent. |
| "Mason" .. .. .. .. .. .. .. .. .. .. .. .. .. | Per hour. |
| "Ditto, setter" .. .. .. .. .. .. .. .. .. .. .. | „ |
| "Ditto, labourer" .. .. .. .. .. .. .. .. .. .. | „ |

Follow with any material, as in previous trades.

"*Slater.*"

The various kinds, as in a bill.

| | |
|---|---|
| "Slater" .. .. .. .. .. .. .. .. .. .. .. .. | „ |
| "Ditto, labourer" .. .. .. .. .. .. .. .. .. .. | „ |
| Various slates .. .. .. .. .. .. .. .. .. .. .. | Per thous |
| Nails of various kinds .. .. .. .. .. .. .. .. | Per lb. |

### "*Carpenter.*"

Describe materials.

Arrange items as in bill of quantities.

Labours (on the various woods) "extra on deal" .. Per cent.

"Fixing to ordinary straps and bolts, to floors, roofs, &c." .. .. .. .. .. .. .. .. .. .. .. .. .. Per cwt.

"Carpenter" .. .. .. .. .. .. .. .. .. .. .. .. Per hour.

"Labourer" .. .. .. .. .. .. .. .. .. .. .. ,,

"Fir, no labour" .. .. .. .. .. .. .. .. .. .. Per foot cube.

"Nails" .. .. .. .. .. .. .. .. .. .. .. Per cwt.

"Spikes" .. .. .. .. .. .. .. .. .. .. .. ,,

### "*Joiner.*"

Preamble as to the same trade in quantities.

And the items arranged in similar order.

But a modification of form will be required to meet the various thicknesses, and save items, thus:—

| | ½ in. | ¾ in. | 1 in. | 1¼ in. | 1½ in. | 2 in. | 2½ in. | 3 in. |
|---|---|---|---|---|---|---|---|---|
| "Deal per foot superficial, with no labour in day account" .. .. .. | | | | | | | | |
| Follow with the variations, as— | | | | | | | | |
| "Ditto fixed with nails or screws .. .. .. | | | | | | | | |
| "Ditto wrought one side" &c. | | | | | | | | |

The same arrangement will be required for doors, sashes, frames, &c.

Work in various more expensive woods, thus:—

"Add on prices of labour and materials in deal, for work in Honduras mahogany" .. .. .. .. .. .. .. Per cent.

"Joiner" .. .. .. .. .. .. .. .. .. .. .. .. Per hour.

"Labourer" .. .. .. .. .. .. .. .. .. .. .. ,,

"On all ironmongery, to include profit and fixing to deal in all cases, an addition on the net price to contractor of" .. .. .. .. .. .. .. .. .. .. .. Per cent.

"Ditto ditto for fixing to wainscot or other hard wood" .. .. .. .. .. .. .. .. .. .. .. .. ,,

### "*Founder and Smith.*"

Preamble as to the same trade in quantities, also "The prices for columns, girders, and joists, to include all hoisting and fixing in all trades except the addition mentioned in bricklayer's schedule."

"The fixing to ironwork of roofs and floors is included in carpenter's schedule."

"All prices throughout to include smith's attendance and fixing, and with the above exceptions the prices are to include fixings in all trades"

| | |
|---|---|
| "Cast iron in girders from 5 cwt. to a ton in each for the first casting, including pattern" | Per cwt. |
| "Ditto ditto, for subsequent castings from same patterns" | " |
| "Ditto ditto, above 1 ton first casting" | " |
| "Ditto ditto, other castings" | " |
| Follow with the various articles, as columns, &c. | |
| "*Wrought iron.*" The various kinds | Per cwt. or lb. |
| "Smith" | Per hour. |
| "Labourer" | " |

### "*Bellhanger.*"

Preamble as to the same trade in quantities.

| | |
|---|---|
| "Pulls to bells, fixing only." | Each. |
| Bells (describe) | " |
| "Bellhanger" | Per hour. |
| Materials. | |

### "*Gasfitter.*"

| | |
|---|---|
| "Allowance off Russell's list for patent welded tubing, with all requisite bends, tees, nozzles, joints, &c., after allowing for fixing same, including cutting away, making good, and general attendance, testing pipes, and leaving perfect at completion" | Per cent. |
| "Ditto, in day work" | " |

"*Note.*—The above prices to be applied likewise to similar pipes for water or other purposes. The pipes to be of the very best quality, equal to Russell's best, but no defective or inferior work will be passed on the plea that the ironwork is from Russell's."

| | |
|---|---|
| "Gasfitter" | Per hour. |
| "Labourer" | " |
| Materials. | |

### "*Plasterer.*"

Preamble as to the same trade in quantities.

Items in the usual order of a bill.

| | |
|---|---|
| "Cast enrichment (including modelling if 60-feet run is used)" | Per foot run. |
| "Plaster screeds 6″ by $\frac{3}{4}$″" | " |
| "Plasterer" | Per hour.

"Labourer" .. .. .. .. .. .. .. .. .. Per hour.
"Boy" .. .. .. .. .. .. .. .. .. .. ,,
Various materials, as lime, sand, hair, laths, nails, &c.

"*Plumber.*"

Items in the usual order of a bill.
"Allowance on prime cost of brasswork, w.c. apparatus, &c., to include fixing but not joints .. .. .. .. .. Per cent.
"Plumber" .. .. .. .. .. .. .. .. .. Per hour.
"Labourer" .. .. .. .. .. .. .. .. .. ,,
"Solder" .. .. .. .. .. .. .. .. .. .. Per lb.
Materials.

"*Glazier.*"

Preamble as to the same trade in quantities.
Items in the usual order of a bill.
"Extra for bedding in wash leather" .. .. .. .. Per foot supl.
"Ditto ditto indiarubber" .. .. .. .. ,,
"Ditto ditto red-lead putty" .. .. .. ,,
"Glazier" .. .. .. .. .. .. .. .. .. Per hour.
"Putty" .. .. .. .. .. .. .. .. .. .. Per cwt.
Materials.

"*Painter.*"

Preamble as to the same trade in quantities.
Items in the usual order of a bill.
"Painter" .. .. .. .. .. .. .. .. .. .. Per hour.
"Labourer" .. .. .. .. .. .. .. .. .. ,,
Materials, as linseed oil, boiled oil, turps, size, &c.

"The above ruling prices are to be applied, with such variations as may be necessary, as the basis of valuation to all measured work as far as possible, but in cases to which no price is found applicable in the above schedule the work shall be priced at (rate) per cent. below the prices contained in 'Laxton's Builder's Price Book' for the year . . . , or for work not therein mentioned at (rate) per cent. above cost price, to be valued and assessed by the surveyor subject to the decision of the architect."

"TENDER."

"To Architect,
(Address)
"Sir,

. . . . . . willing to contract for and hereby undertake to execute the various works required in erecting (describe building and its position)

according to the plans and specification prepared and to be prepare
you for that purpose to your entire satisfaction, and subject to the va
stipulations and conditions hereinbefore written, at the several prices
rates hereinbefore specified.

"As witness . . . hand this . . . day of . . . ."
(Name)
(Address)

On the outside of the schedule, besides the usual endo
ment, clauses of the following general tenor:—

"The schedules of the builders will be treated as confidential d
ments, and those which are not accepted will be returned under c
immediately."

"The plans and drawings showing the character of the building
be inspected at the architect's office."

"Tenders to be delivered at the architect's office before twelve o'cl
at noon, on (date)."

Another method adopted occasionally for schedules
prices is to prepare the schedule as before explained,
prices being filled in by the surveyor at prices rather ab
the current rates, so that tenders may all be at a percent
below them, and a clause is inserted thus :—

"The contractor to fill up the form of tender at the end of schedule,
to state thereafter the names of sureties proposed."

"No alteration to be made in the printed prices, the percentage
general on the whole schedule."

At the end of schedule annex a tender, as follows :—

"To Architect,
(Address)

. . . . . . . the undersigned, do hereby tender and undertak
execute, perform, and supply with the best materials and workmans
of their respective kinds, all and every such works, services, matters,
things as are enumerated in the schedules hereto annexed, and
quantities which may be required at (rate) per cent. (above or below,
the contractor agrees to all the rates as they stand erase the words
cent.) the prices affixed to each item in the said schedule according to
terms and conditions annexed, and . . . hereby agree that . .
will enter into and execute a proper contract for giving effect to
tender, and that (we or I), and also the proposed sureties herein
named, will execute such instruments as you may require, founded

this tender and the conditions and schedule hereunto annexed, which form part of this tender, and that the bond to be entered into by (us) the contractor and the said proposed sureties shall be in the sum of pounds, jointly and severally.

"As witness . . . hand this . . . day of . . .
(Signature of contractor)
(Address)

Names and addresses of proposed sureties follow here.

When this latter method is adopted it is obvious that analysis will not be required.

The necessary particulars as to modes of measurement are chiefly connected with masonry. The following examples will afford some guidance as to the requirements in such cases :—

## *Modes of Measurement prescribed for the new Houses of Parliament, Westminster.*

### MASON'S WORK.

**CUBE STONE.**—If square, to be measured the net size when worked; but where the stone is not of a square form, to be measured to the size of a square stone of the least extent required. Where the stones are of scantling lengths of 6 feet or upwards, to be measured separately from the ordinary cube stone.

**DRAFTED BACKS.**—The backs of the stones where drafted to be measured according to the surface actually shown.

**PLAIN AND SUNK BEDS.**—One plain bed only to be taken for each stone, except to mullions of windows, for which two beds are to be taken to each stone. Ordinary arch stones to be considered as having one plain bed and one sunk bed.

**PLAIN AND SUNK JOINTS.**—Not more than one plain joint to be taken for each stone having one or more plain joints. All sunk joints to be taken as they occur.

**CHISELLED OR RUBBED FACES.**—To be measured to the size actually shown on the external surface.

**ROUGH SUNK.**—To be taken when a large quantity of stone has to be removed, as in stop mouldings to sills, window heads, and other similar work.

Sunk, Chiselled, or Rubbed Faces.—To be measured on the surface actually worked, adding the depth of the sinking.

Stopped Sinking.—To be measured in such situations as do not permit the work to be carried straight through the stone, as in sills of windows and other similar work.

Preparatory Labour or Plain Face as Bed.—To be taken wherever it is necessary to produce a face for the purpose of setting out underwork, as in tracery heads and other similar works. This is also intended to apply to mullions of windows, one side and one edge of which are to be taken plain as bed.

Sunk, Chiselled, or Rubbed Face in Short Lengths to Hexagonal Canopies.—To be measured as they occur, including arrises.

Mouldings.—To be girthed, the surface actually shown the top bed, if weathered, only to be measured as sunk face.

Mouldings to Panellings.—To be girthed, including the backs of the panels.

Circular Face to Soffit of Cusps.—To be measured the whole thickness of the stone from back to front.

Circular Face to Soffit of Cusps in Panelling.—To be measured from the external face of the stone to the face of the panelling.

Sunk Faces to Tracery Heads of Panelling.—To be measured net on the face, adding the depth of the sinking from the external face.

Sunk Face in Margins for Eyes.—To be measured the extreme length and width.

Circular Sunk to Rebated Soffit of Cusps.—To be measured from the external surface, adding the depth of the rebate.

Mouldings in Tracery.—The extreme lengths of the straight mouldings in the tracery of the window-heads to be measured through the mitres and junctions with other mouldings.

Throat.—To be measured *per foot run.*

Groove for Cement.—To be measured *per foot run.*

Groove for Metal Sashes.—To be measured *per foot run.*

Rebate not exceeding Three Inches Girt.—To be measured *per foot run.*

Mitres to Sinkings.—To be numbered according to width.

Mitres and Returns to Sinkings.—To be numbered according to the width of the sinking and length of the return.

Mitres to Mouldings.—To be numbered according to the girt of the moulding.

Mitres to Long Intersections of Cusped and other Mouldings.—To be numbered according to the girt of the moulding and length of run.

Stopped Ends of Mouldings.—To be numbered according to girt of moulding.

Stopped Ends of Mouldings on Splayed Sills and Sills of Panels.—To be numbered according to the girt of moulding and extreme length from top of sill to point of intersection.

Rough Sinkings for Cusped Window Heads and Similar Sinkings.—To be numbered, taking the average area of the sinking and the full thickness of the stone.

Holes Punched.—To be numbered according to their area and depth.

Sinkings to form Shingles.—To be numbered as they occur, according to length, width, and depth of sinking.

Notchings to form Embrasures.—To be numbered according to their height, width, and depth of sinking.

Water Joints.—To be numbered according to their projection.

Mitres to Soffits of Cusps in Tracery Heads of Windows. —To be numbered according to their length, and taken the full thickness of the stone.

Mitres to Soffits of Cusps in Small Tracery Heads of Panelling.—To be numbered according to their length, measured from external face of stone to back of panelling.

Points to Cusps in Tracery Heads of Windows.—To be numbered according to their length, and measured the whole thickness between the sunk faces.

Points to Cusps in Small Tracery Heads of Panelling.—To be numbered according to their depth from sunk face to back of panelling.

Sunk and Moulded Œilets, each with One Mitre and Two Long Intersections.—To be numbered according to extreme size.

Small Sunk Eyes.—To be numbered.

Cramps out of Saw Plate.—To be numbered according to length.

Cast-iron Cramps.—To be numbered according to length and thickness.

Plugs.—To be numbered according to length and size.

Small Copper Joggles and Mortices.—To be numbered.

Stone Joggles and Mortices.—To be numbered.

Joggles to Vertical Joints with Pebbles in Cement.—To be numbered according to size.

Paving and Landings.—To be measured *per foot superficial.*

Perforations to Landings.—To be numbered according to size and the thickness of the stone.

## BRICKLAYER'S WORK.

The brickwork to be measured according to the number of bricks in the thickness of each wall, deducting all openings, except pargetted flues.

Cutting.—To be allowed for skewbacks of arches and surface cutting, but no cutting to be allowed for the interior of arches, excepting circular groined arches.

Pointing to Soffits of Arches and Lime Whiting.—To be measured *per foot superficial.*

Cement to Back of Parapets.—To be measured on the surface *per yard superficial.*

Rough Splay.—To be measured *per foot run* where it occurs

Groin Points.—To be measured *per foot run.*

Pointing to Lead Flashings.—To be measured *per foot run.*

Iron Hooping.—To be measured *per yard run* the quantity actually used.

## CARPENTER'S WORK.

All framed timbers to be measured cube; the net quantity used in the work, fir or oak, in plates, corbels, and lintels, to be measured separately.

Battening for Slating.—To be measured on the surface of the roof *per square.*

Boarding for Lead.—To be measured on the surface *per foot superficial.*

Valley and Eaves, Boards, Gutters, and Bearers, and Boarding to Sides of Gutters — To be measured *per foot superficial.*

Labour to Rounding Ridges and Labour to Rebates.—To be measured *per foot run.*

Labour to Splayed or Bevelled Edge or Joist.—To be measured *per foot run.*

Tilting Fillets and Rolls for Lead.—To be measured *per foot run.*

Rebated Drips, Rounded Heads to Rolls, Short Rounded Rolls, and Dovetailed Cesspools.—To be numbered.

Timber prepared in Kyan's Tank, including carriage to and from.—To be measured at *per load.*

Fixing Bolts, Straps, and Cast-iron Heads.—To be numbered.

Fixing Cast-iron Work.—To be included in the price of the same by weight.

Wrought Iron provided for Bolts, Straps, &c.—To be charged according to the weight actually used.

Centering to Brick Arches.—The quantity to be measured on the soffit of the arch at *per square.*

Flewing Centering to Pointed Apertures.—To be measured *per foot superficial.*

Centering to Stone Arches.—To be measured on the soffit of the arch at *per square.*

## SMITH AND FOUNDER'S WORK.

Cast-iron Work.—To be provided, proved and fixed complete, at per cwt. including patterns.

Wrought-iron Bolts, Straps, and Ties.—To be provided ready for fixing at per cwt.

Linseed Oil Rubbed into Girders.—To be measured at *per yard superficial.*

## SLATER'S WORK.

**Slating.**—To be measured on the surface at *per square*, allowing 1 foot for eaves, 1 foot for each valley and hip, and 6 inches for cutting to sides of dormers.

## PLUMBER'S WORK.

**Lead.**—To be provided and laid by weight, which weight is to be ascertained by admeasurement when the work is completed, the weight *per foot superficial* being previously ascertained in the sheet.

**Soldered Angles.**—To be measured *per foot run.*

**Dots, Lead Plugs, Lead Wedges and Socket Pipes to Cesspools.**—To be numbered.

**Cast-iron Rain Pipes.**—To be measured *per foot run.*

**Cast-iron Heads and Shoes.**—To be numbered.

**Bearings and Collars.**—To be numbered.

**Eaves Gutter.**—To be measured *per foot run.*

## PAINTER'S WORK.

**Painting to Cast-iron Work.**—To be measured *per yard superficial.*

**Painting to Straps, Bolts, etc.**—To be measured *per foot run.*

**Painting Bolts and Heads to Trusses.**—To be numbered.

## PREAMBLE OF A MASONRY SCHEDULE OF THE WAR DEPARTMENT.

### *General Regulations and Specification for the Work.*

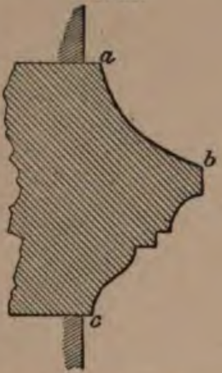
1. The stone in masonry, steps, landings, sills, coping, flagging, hearths, channels, and sinks, is to be placed with the grain or natural quarry-beds horizontal: in arches the grain is to radiate to their centres; in all curbs the grain is to be vertical.

2. In the admeasurement of stonework it is to be understood that those portions only will be paid for as moulded work that have members on them or irregular curves; for instance, in a cornice, as per sketch, Fig. 21, that portion from

*a* to *b* will be paid as circular work, and from *b* to *c* as moulded work.

3. Plain work, circular plain work, sunk work, circular sunk work, moulded work, and circular moulded work, are to be paid for according to the following system:—The material being allowed for, at per foot cube, according to Item 1 or 2, and plain work, for faces so wrought, the other workmanship is to be paid for according to the items for sunk work, moulded work, &c., as the case may require. Beds and joints to be paid for as half plain work. The setting to be paid under Items 4 to 7 respectively, and the same quantity will be allowed as given for the stone.

FIG. 21.



4. Mantels and jambs are to be paid for by the measurement taken on the face only.

5. In measuring window sills of other dimensions than those named in the Schedule, the full cubic quantity of stone is to be allowed; then the work upon them as follows, viz.:—The top superficies is to be taken as plain work, from the back edge to the sinking; from thence to the front edge is to be taken as sunk work; the two ends, the front edge, and projecting part of the under side are to be taken as plain work.

6. The prices for steps include plain smooth work to tread, bed and riser; and any further work, such as back joint or rubbed work on face, riser, and soffit, or plain work to soffit or back edge, will be paid for in addition. The net quantity only in winders will be allowed, ascertained by measurement of the extreme length by the mean width and thickness.

7. STONEWORK SUNK.—In stonework sunk, except in sawn stone alluded to in Art. 9, the net quantity of material obtained from the measurement from the extreme points, when wrought, as shown in the annexed sketch, Fig. 23, will

be allowed according to Items 1 and 2 respectively, and the same quantity for setting under Items 4 to 7 respectively. Half plain work for beds and joints as in Art. 3, sunk work for the top, and plain work for the front edge. The dotted lines in diagram denote the quantity of stone allowed. The net quantity of beds on irregular ashlar stonework, where backed by brick or rubble work, and the net depth of the joints only as shown in Fig. 22, will be allowed.

Fig. 22.

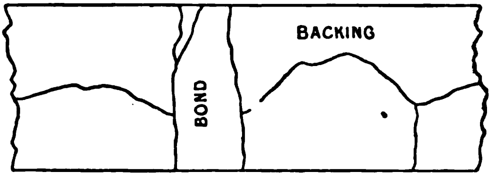


Fig. 23.

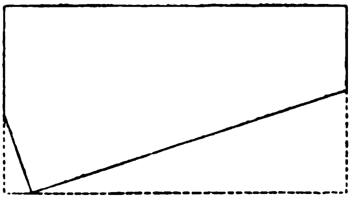
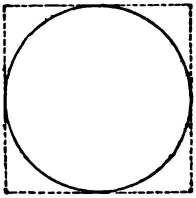


Fig. 24.



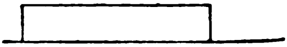


Fig. 25.

8. Circular Work.—In circular work, the material being measured, the extreme length, by extreme breadth and height (when wrought to the prescribed dimensions) being, allowed for, as shown in the annexed sketches, Figs. 24, 25, 26, and 27, and the same quantity for setting; the top surface in each case to be allowed for plain work, when so wrought, the inner and outer faces, Figs. 26 and 27, and the edge of Figs. 24

and 25, as circular work; the beds as half plain work, and the radiated joints, Fig. 26, as rough sunk work, under Item 17. The dotted lines in the diagrams denote the quantity of stone allowed.

Fig. 26.

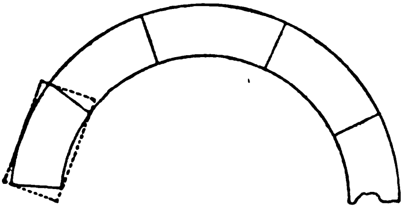
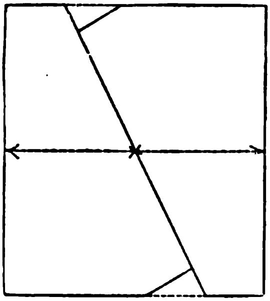


Fig. 27.

9. Stonework Sawn.—In stonework, where the stones be sawn one out of the other, the mean dimension only will be allowed. For instance, copings cut the one out of the other, the dimensions for the height to be taken in the centre, instead of at the extreme height when wrought to the mould, as shown by the annexed diagram, Fig. 28. The same quantity will be allowed for setting.

Fig. 28.



10. Sunk Work.—By "sunk work" is to be understood the weathered part of a cornice or window sill, the weathered part of a coping as Figs. 23 and 28, the three faces of a diminished pilaster, and the sinking in a stone sink. In the latter case, the superficies of the bottom, added to that of the sides, will comprise the quantity of sunk work. In the case of perforations in sink stones, they will be paid for under Items 242 and 243.

11. Circular Work.—By "circular" work is to be under-

stood such work as the concave and convex faces of curbs, as shown in Figs. 24, 25, 26, and 27, and the face of a parallel column.

12. SUNK CIRCULAR WORK.—By "sunk circular" work is to be understood the face of a diminished column, or the hollowed work of a channel which increases or diminishes as it extends, and all work of this character.

13. RUBBED WORK.—To the price of "rubbed work," in Items 1[illegible] to 24, will be allowed plain work under Items 9 and 10; and to the price of "rubbed" work on such as the three faces of a diminished pilaster, the weatherings of cornices and copings, and such work, denominated "sunk," the price of sunk work will be allowed; and likewise in rubbed cornices the price of moulded work will be allowed; and in rubbed circular plain, circular sunk, or moulded circular work, will be allowed respectively plain circular, sunk circular, and moulded circular work.

14. By the terms "plain" work, "sunk" work, or "moulded" work, is to be understood as follows, viz., on Portland York, or Scotgate ash stone a tooled stroke over all the respective faces, with a draughted margin around each stone of ashlar work. On Purbeck, a broached or picked face, as may be ordered, with a draughted margin; on granite and Bramley Fall, a smooth tooled face; and on Bath, Caen, or Painswick, a combed or dragged face.

15. The portions of the General Regulations and Specification which are attached to the Bricklayer's Schedule, and are applicable, are to be considered as a part of this Schedule.

### ADJUSTMENT OF ACCOUNTS.

The adjustment of the accounts relating to a building is usually entrusted to the surveyor who prepared the original quantities who then acts on behalf of both builder and architect. The conditions which will facilitate the surveyor's work in such a case are the following:—

The bill of quantities deposited either with the architect or the quantity surveyor.

The schedule of prices (when there is one) also deposited.

When it has been made one of the conditions of the contract that no extra shall be allowed for unless a written order has been given by the architect the builder should produce these orders, and where this condition is insisted upon by the architect only those works should be admitted for which orders are produced. When the builder, nevertheless, proposes to make a claim for such works the surveyor may measure them, but he should make a separate account of them, and should stipulate that the charges for their measurement shall be paid by the builder in the event of the claim being disallowed. The surveyor should at the same time inform both builder and architect that he does not by the measurement give any opinion as to the claim further than their quantity and price.

The surveyor, when requested to arrange the accounts, should obtain from the clerk of works, or the architect where there is no clerk of works, and the builder's foreman respectively, a list of works which they believe to be extra on the contract. Both foreman and clerk of works should be instructed to keep notes of extra works as the building proceeds. An appointment should then be made to meet on the works the architect, or his clerk of works, builder (or his surveyor), and tne builder's foreman. The lists before mentioned should then be regularly gone through, and such items as are admitted to be extras, and require to be measured, entered in the measuring book.

Before this meeting, or a tsome convenient opportunity during the measurement, look carefully through the bills and dimensions to see what omissions there are; see also what provisions require to be adjusted. *Notice* the way in which the original bill has been priced, if the builder has in his pricing disregarded all the general items of labour on stonework, your measurement will deal with the stone as including all labours. Facings to brickwork are also not unfrequently priced in a similar manner. (See also section "Law of Quantity Surveying.") A list of these should also be written in the measuring book. As each item is measured draw a vertical line through it, and put a reference against it to the page whereon it has been measured. Thus:—

"Provide for | gasfittings, 50*l.*; measured, p. $\frac{40}{150}$," &c.;

and when the dimensions are in a different book state the number of the book as above.

When work requires to be kept in several sections it may be advisable to use a separate measuring book for each section.

Leave several pages at the commencement of each of the measuring books for an index, and when the book is filled make an index.

In a large measurement it will be found necessary to keep a list of notes of work incomplete, and which it has been impossible to measure, so that the surveyor may return to them when they are ready to be measured.

If the building be a large one, and the measurements extending over a considerable period, the surveyor should make tracings of the working drawings and colour with a wash of colour the parts as they are measured. The uncoloured portion will then show him at a glance what remains to be done. This expedient is specially useful when he has to make periodical measurements and reports, as for certificates.

After the space for index write a heading for the book, thus:—

"*Measurement of Variations.*

"House and offices at Sutton, Surrey, for John Smith, Esq.; Mr. Neal, clerk of works; Mr. Thompson, foreman, with Mr. J. Greene, surveyor.

"24th June, 1878. __________ Esq., Architect."

Do not measure an omission if it comes to within 5 per cent. of the original estimate, as it is worth little more than the measuring charges; and it should be observed that the measurement of an extra is often pressed by either side, which the omission on the same part of the work much more than counterbalances.

The surveyor, when measuring, should have the dimensions called out at each measurement by the man using the rods or tape, and should look at the figures each time to see that it is called correctly; or he may, if he prefers it, measure the work himself, and have a clerk with him to book the dimensions. Follow the mode of measurement adopted in the original quantities as far as possible, so as to readily apply the prices.

The measurement having given you the additions, a reference to the dimensions will give you the omissions; these may be referred to by letters as before recommended. See "Variations before acceptance of Tender."

For omissions use the word "omit," not "deduct." Where no quantities have been supplied, certain items of omission may be obtained from the builder's original estimate if he will produce it; if he declines, the work must be measured from the drawings and specification.

When a surveyor is employed by the builder to meet the architect's surveyor, both surveyors will book identical dimensions, will have the dimensions squared, and at convenient times after the measurement cause to be compared the respective books, and errors corrected; if not done at this stage errors will be abstracted, and they will be much more troublesome to rectify.

The surveyor for the architect should then abstract the contents of the books and forward them to the builder's surveyor to check.

When there are omissions and additions on a particular section of the work, the abstracter should abstract the omissions and additions as they occur in the book. He will thus much more readily detect any error that may exist than he will if he first abstracts the additions throughout the book and then recommences the book and abstracts the omissions.

Head each of the abstracts with the usual heading, and also write on each, at the upper left-hand corner, "omissions," or "additions," as the case may be, and the distinguishing numbers of the measuring books, both in red ink.

After the abstracts are checked, the measurement should be brought into bill, the work being either collected in the same manner as in a bill of quantities, or the particular work to each alteration kept separate, but the former way is preferable if there is no special reason for showing the total amount each item of extra work has involved. The latter way greatly increases the length of the account. If you adopt it you may usually bill the items direct without abstracting; any necessary abstracting can be done on the margin of your draft bill in small figures, and can be checked by the clerk who checks the bill and at the same time. Its advantages are that comparative prices are more likely to be kept in view and discrepant ones less likely to occur.

If, however, the necessity should afterwards arise of showing the omission and addition involved by each alteration, the course first mentioned will subject you to the trouble of abstracting and billing the account afresh, and probably you will be unable to make any further charge.

Whichever way be adopted, let the omissions come first and the additions after, both being separately carried to the summary. Head each page with the word "omissions," or "additions" in red ink. The order and phraseology of the original bills should be adopted wherever it applies, as this will facilitate the pricing. In the case of omission, no more of the description in the original bill need be adopted than may be necessary to identify an item, and much writing may often be avoided by writing a part of a description and referring to the page of the original bill for the remainder.

When there is a deposited bill of quantities the prices obtained from it are best written in red ink, as it is usually convenient to distinguish them from the prices which have been affixed independently; these latter should be written in pencil. After the rates are attached to the items, the bill should again be forwarded to the builder's surveyor that he may check both the billing and rates of items. Difference of opinion as to rates may be arranged at a meeting of the two surveyors and the settled prices filled in with black ink as they are agreed on.

It is argued by some surveyors that the builder should attach the prices to the bill of variations and the architect's surveyor check them, their idea is that the builder may thus ask smaller rates, on some items, than the architect's surveyor might attach and an advantage be thus gained by the client. If the architect's surveyor is incapable, or wishes to gain an advantage, this is the better course for him to adopt; but if he knows his business, and is desirous only to do justice, the course first suggested is preferable.

In cases of disputed prices the surveyor may be able to persuade the builder to produce his prime cost book, and if he is satisfied that there is no error in the statement he may, after adding a reasonable profit, adopt the price thus arrived at.

When the rates have been agreed upon, the items should be carried into the money column, then checked and ticked in pencil, then checked again and the amounts written in ink. The second checker invariably finds errors, but this second checking is rarely done.

There are a few common precautions which should be observed in pricing and checking, write $\overset{\text{d.}}{\frac{1}{4}}$—$\overset{\text{d.}}{\frac{1}{2}}$—$\overset{\text{d.}}{\frac{3}{4}}$ not $^1/_4$—$^1/_2$—$^3/_4$, these are frequently mistaken for $\overset{\text{s. d.}}{^1/_4}$—$\overset{\text{s. d.}}{^1/_2}$—$\overset{\text{s. d.}}{^3/_4}$.

See that every item is carried into the money column, both in items and casts. The clerk checking the casts should place a small piece of paper over the results, so that his calculations may be independent of the former man's work.

The tendency of increased experience is usually to incline the surveyor to more liberal treatment of the builder, it is well however to remember that his liberality is at his client's expense.

The day accounts of extra work should be delivered by the builder within a week of the work being executed, and if the work is to be concealed as in foundations or other work not easily accessible, it should be examined and measured before it is covered.

Day accounts should only be allowed for works in which labour, and that not straightforward, is the principal item: as attendances upon other workmen, alterations of works already executed, pulling down, shoring, underpinning, &c. Work of the usual character, and which has entailed no special trouble, should not be charged day work but measured.

If a clerk of works is employed, he should examine and sign each day account before it is delivered to the architect or quantity surveyor. Where the work is extensive, it is the better practice for the quantity surveyor to take charge of the day accounts; he should carefully examine them as they are delivered, and when he discovers errors, return the day account at once to the builder for explanation or alteration.

When the materials and labour in a day account do not amount to more than the proper price for the piece of work measured as fixed, it may be accepted; it would be mere waste of time to measure it; but this is seldom the case; it will often be found that the charge for time alone amounts to more than the legitimate charge for both labour and materials.

The surveyor should be watchful of day accounts, and will find his trouble well repaid. Surveyor may also succeed in separating things which can be from those which cannot be measured.

In day accounts for pulling down, see that you have credit for the bricks and other materials.

Material comprised in day accounts is frequently charged by the builder as finished work instead of simple material, and the time is also charged for fixing. In the case of joinery it should be kept separate, and described as "from Bench," and is worth a less price than similar work in the priced bills, as the latter includes fixing; "stone from Banker" is a similar case.

In measuring complex joinery, sections of the mouldings, frames, &c., may often be obtained and will be found useful when you are valuing.

In measuring work from Bench or Banker, observe to omit such parts of the labour as are of necessity done in the course of fixing; as plugging mitres, mortises, ends cut and pinned, &c.

When work has been altered it will be best to measure the work as originally made or fixed, allowing the alteration as a day account.

Foreman's time is not unfrequently the subject of dispute. When there is a stipulation in the schedule of prices that the general foreman's time should be included in the price per hour for general workmen, or some other similar condition, the question is settled. Where no condition exists, and where work has been done requiring the foreman's exclusive superintendence, as in the case of small jobbing, executed when all but the men occupied upon that work have been discharged, or in special works requiring an undue proportion of his time, a fair amount of time should be allowed.

On examination of the preliminary bill the surveyor will discover some items which are priced, possibly at a sum altogether disproportionate to the work involved. If these items are "allows," i. e. at contractor's risk, they should not be deducted, for if they cost contractor many times as much as the sum he has in his estimate, he would be bound to do the work without extra charge, and by parity of reasoning, the items should not be interfered with if they should prove unexpectedly profitable; moreover, the contractor might insist upon the readjustment of other clauses of the same character if any were interfered with.

The adjustment of provisional sums is also a fruitful source of difference. The method of treatment will depend upon the way the provisions have been arranged in the original bill. In all cases the surveyor should insist upon the production of the original invoices, not copies.

Taking as an instance, a provision of 100*l.* for stoves under its various forms, its adjustment should be as follows:—The invoice is, say, 50*l.*, the trade discount of stoves is 20 per cent., a fair profit to allow is 15 per cent.

When no special clause exists as to the deduction of provisional sums net, and the provision appears in the priced bill as—

| | | | | |
|---|---|---|---|---|
| **A.** Provide for stoves 100*l.* .. .. | | 100 | 0 | 0 |

the setting will be charged as a day account unless the setting has been taken in the quantities. The 100*l.* will be deducted. The difference between 15 per cent. and 20 per cent. = 5 per cent. will be deducted from the amount of invoice, and the amount will be 47*l.* 10*s.*

When the item appears as below, contractor has fixed his profit at 5 per cent.:—

| | | | | |
|---|---|---|---|---|
| **B.** Provide for stoves 100*l.* .. .. | | 105 | 0 | 0 |

deduct the 105*l.* and allow 50*l.*, minus 15 per cent = 42*l.* 10*s.*

Sometimes the item will appear as follows:—

| | | | | |
|---|---|---|---|---|
| Provide for stoves 100*l.* and add profit | | 105 | 0 | 0 |

Treat this in this same manner as **B**.

When there is a condition for the deduction of provisional amounts net—

If the amount appears as **A** deduct the 100*l.* without any allowance for profit, and add the amount of invoice less the trade discount—result 40*l.*

If the amount appears as **B** deduct the 105*l.*, and as the difference between 100*l.* and 105*l.* equals 5 per cent. allow 50*l.* minus 15 per cent., the difference between the trade discount and the profit allowed by builder—result 42*l.* 10*s.*

P. C. means the amount paid by contractor after deducting trade allowance but not ordinary discount for cash, but disputes may be saved if a clause to this effect is put into preliminary bill.

Within the metropolitan area many kinds of goods are delivered free of charge, but if carriage should be claimed, see the delivery note or some voucher for the payment, and allow it in addition to the foregoing allowances.

In some instances an exorbitant discount has been added to produce the amount of invoice as the result of collusion between builder and manufacturer. Nothing will meet such cases as these but great knowledge of prices, and the precaution of dealing only with firms of proved honesty.

A claim is sometimes made for profit on work omitted. As, if an original tender amounts to 10,000*l.*, the omitted work 1000*l.*, and the extra works 500*l.*, the net profit which would have accrued upon 500*l.*, the difference between extras and omissions, should properly be allowed; but observe to allow only net profit, 5 per cent. will generally be an ample allowance for such a claim, and also remember that in some cases you will be able to prove that the omission of the particular part of the work has been an advantage to the builder rather than a loss. You can, however, if you prefer it, put the following clause on preliminary bill, "no allowance will be made for the loss of profit on omitted work."

Unless a special clause to meet such contingencies has been included in the schedule, claims may be made for water, tackle, hire of scaffolding, and plant; tool sharpening, &c., and such claims must be allowed, but with careful consideration of the amounts.

Payment for lodgings of workmen is usually allowed if the charge is really incurred by the builder. Surveyor should see vouchers, if any exist.

If works are stopped by the fault of the architect, or the building owner, for an unreasonable time, the contractor will have a just claim for hire of plant and wages of watchman.

In the course of practice, exorbitant claims will be met with usually founded on day accounts. If you are certain of their injustice, two arguments are usually available:—

Non-delivery of day accounts. The time prescribed for completion has been exceeded. The repudiation of the day accounts or the claim for liquidated damages will, as a rule, modify the demand.

The first of these pleas should, however, only be urged in cases of flagrant attempts at extortion.

Claims for liquidated damages should only be reckoned by the working days. The period claimed for may be reduced by wet days, and by delays caused by architect, as failure to furnish details or to give instructions when applied for, or by time occupied by extra works.

If the endeavours of the surveyor are after all insufficient to produce a settlement, the only alternative is a reference. As a preliminary, settle every point that can be settled and carefully define the points to be submitted by agreeing upon a list of them with the opposing surveyor; and, if possible, pledge the builder to a promise that he will make no claim beyond those agreed upon before the submission.

When the builder has a weak case, and is conscious that he has no useful witness, he may possibly propose to call no witnesses on your promising to call none. Carefully avoid such promise.

The day work should be brought into bill either in one total or several as suggested for the measured work, which latter it should follow in either case.

If the surveyor who has measured the work can also abstract it, there will be far less liability to error.

Keep the original bill before you when billing "Omissions," as you will sometimes find that the quantity of a particular item exceeds that in the original bill.

In abstracting day accounts, the shortening of the bill as much as possible should be a leading motive; sacks, bushels, hods, &c., of cement being abstracted under their various headings, may all be afterwards reduced to bushels and so billed; the various measures of lime, sand, and mortar, may be similarly treated; rough fir may be reduced to the foot cube before abstracting; deal of various thicknesses to the foot superficial.

Collect the time for each trade: as excavators, bricklayers, &c., with their labourers following them.

### A.—Form of a Bill of Variations.

Variations on Contract.
House and offices at Sutton, Surrey, for John Smith, Esq.
_______________ Esq., Architect,
24, Montague Square,
London, W.C.

*November*, 1878.

*Omissions.* £ s. d.

Begin with a preamble stating the leading items of the work.

The items trade by trade in the order of the original bill.

Carried to summary .. .. .. £

*Additions.*

The items trade by trade in the order of the original bill.

Carried to summary .. .. .. £

Note.—The trades will not be separately carried to summary, the omissions and additions respectively will form one total, and a heading to each trade is unnecessary, a small space between them is sufficient.

*Day Account.*

Begin with a synopsis something like the following:—

"Cutting away and shoring to front of house, inserting iron girders, filling up openings of flat, building new bay window, removing old floor, &c."

"Bricklayer 150 hours" .. .. .. .. .. .. .. ..
"Ditto labourer 200 " " .. .. .. .. .. .. .. ..
"Mason 180 " " .. .. .. .. .. .. .. ..
"Ditto labourer 220 " " .. .. .. .. .. .. .. ..

Follow in the same manner with the time of the several trades.

£ s. d.

Materials in the order of the trades in a similar manner to following:—

"50 loads of rubbish carted away" .. .. .. .. .. ..
"20 yards of sand" .. .. .. .. .. .. .. .. .. ..
"20 bushels of Portland cement" .. .. .. .. .. ..
"3 yards of stone lime" .. .. .. .. .. .. .. .. ..
"3 loads of mortar" .. .. .. .. .. .. .. .. ..
"3000 stocks" .. .. .. .. .. .. .. .. .. .. ..
"50 ft. supl. 3-in. tooled York paving" .. .. .. ..
"50 ft. cube fir," &c. .. .. .. .. .. .. .. .. ..

Carried to summary .. .. .. £

If it should be necessary to show the amount of variation on any particular section of the work, the same order as the foregoing will be observed in each section, but the form will be similar to the following example:—

### B.—Water Supply.

#### *Omissions.*

The measured work item by item in the usual order of the trades.

Carried to summary .. .. .. £

#### *Additions.*

The measured work item by item in the usual order of the trades.

Carried to summary .. .. .. £

#### *Day Account.*

Time and materials in the order before described.

Carried to summary .. .. .. £

#### *Summary* (for **A**).

| | £ | s. | d. |
|---|---|---|---|
| Amount of contract .. .. .. .. .. .. .. .. .. | 5300 | 0 | 0 |
| Additions .. .. .. .. .. .. .. .. .. .. | 1000 | 0 | 0 |
| Day account .. .. .. .. .. .. .. .. .. .. | 500 | 0 | 0 |
| | £6800 | 0 | 0 |
| Deduct omissions .. .. .. .. .. .. .. .. .. | 500 | 0 | 0 |
| | £6300 | 0 | 0 |
| Add surveyor's charges, copies, and expenses .. .. .. | 40 | 0 | 0 |
| | £6340 | 0 | 0 |
| Cash paid to builder on account .. .. .. .. .. .. | 5100 | 0 | 0 |
| Amount due to builder .. .. .. .. .. .. .. .. | £1240 | 0 | 0 |

*Summary* (for **B**).

| | Omissions. £ | s. | d. | Additions. £ | s. | d. |
|---|---|---|---|---|---|---|
| **New bay window** .. .. .. .. .. .. .. .. | — | | | 100 | 0 | 0 |
| **Day account** .. .. .. .. .. .. .. .. | — | | | 21 | 0 | 0 |
| **Billiard room** .. .. .. .. .. .. .. .. | — | | | 540 | 0 | 0 |
| **Day account** .. .. .. .. .. .. .. .. | — | | | 70 | 0 | 0 |
| **Water supply** .. .. .. .. .. .. .. .. | 18 | 0 | 0 | 90 | 0 | 0 |
| **Day account** .. .. .. .. .. .. .. .. | — | | | 10 | 0 | 0 |
| **Laundry** .. .. .. .. .. .. .. .. .. | 94 | 0 | 0 | 120 | 0 | 0 |
| **Day account** .. .. .. .. .. .. .. .. | — | | | 20 | 0 | 0 |
| | | | | £971 | 0 | 0 |
| Deduct omissions .. .. .. | | | | 112 | 0 | 0 |
| | | | | £859 | 0 | 0 |
| Surveyor's charges, copies, and expenses .. .. .. .. | | | | 40 | 0 | 0 |
| Total net additions .. .. .. .. .. | | | | £899 | 0 | 0 |
| Amount of tender .. .. .. .. .. .. .. .. .. | | | | 5000 | 0 | 0 |
| | | | | £5899 | 0 | 0 |
| Cash paid to builder on account .. .. .. .. .. .. | | | | 5000 | 0 | 0 |
| Amount due to builder .. .. .. .. .. .. .. .. .. | | | | £899 | 0 | 0 |

In preparing the final statement for the client, the surveyor will be guided by the amount of detail that may be required, taking the summary A as a basis.

House and offices at Sutton, Surrey, for John Smith, Esq.
*November*, 1878.

*Statement of Account.*

| | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|
| Amount of contract .. .. .. .. .. .. .. | 5300 | 0 | 0 | | | |
| Additions (stating of what they consist) .. | 1540 | 0 | 0 | | | |
| | £6840 | 0 | 0 | | | |
| Omissions (stating of what they consist) .. | 500 | 0 | 0 | | | |
| | £6340 | 0 | 0— | 6340 | 0 | 0 |
| Cash paid to builder .. .. .. .. .. .. .. | 5100 | 0 | 0 | | | |
| Amount due to builder .. .. .. .. .. .. | £1240 | 0 | 0 | | | |

*Amounts separately Certified for.*

| | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|
| Smith, for stoves .. .. .. .. .. .. .. .. | 90 | 0 | 0 | | | |
| Minton, for tile paving .. .. .. .. .. | 50 | 0 | 0 | | | |
| Brown, for gas fittings .. .. .. .. .. | 100 | 0 | 0— | 240 | 0 | 0 |
| Total cost .. .. | | | | £6580 | 0 | 0 |

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When accounts are disputed it will be best to prepare an account in folios, showing items of claim on one side, and your valuation on the other, thus . . . . Reference to items can most easily be made by numbering each one consecutively in red, thus:—

**Work done at Woodcote, Berkshire.**

*July*, 1878.

|  | Rods. | ft. |  |  | *Builder's account.* |  | £ s. d. | *Surveyor's valuation. Remarks.* |  | £ s. |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) | 18 | 68 | 0 | supl. | Reduced brickwork in mortar | 13 – – | 237 5 | Bricks of inferior quality | 12 10 – | 228 2 |
| (2) | 1½ | 0 | 0 |  | Ditto, extra only in cement | 3 10 – | 5 5 0 | Cement inferior and deficient in quantity | 2 15 – | 4 2 |

# CHAPTER VII.

## SPECIFICATIONS.

As it is in many instances the practice to depute the writing of the specification to the surveyor, a few considerations relating to specifications may be of service.

It is always an advantage to have the specification written by the man who takes off the quantities, he checks his own work thereby, and it is better completed before the quantities are lithographed, so that any errors may be corrected. An addenda is generally the result of mismanagement, and unfavourably impresses both architect and builder.

The surveyor should remember, in writing his specifications, that it will save much future reference if he will embody *every* particular upon which the drawings and quantities give no information, otherwise he will be troubled with frequent questions as to the way he has measured the work.

Be careful to state the scantling of everything that it is necessary for the builder to know the size of.

The most convenient way of writing a specification from dimensions is as follows:—Write the whole of the conditions, then the preliminary works and such preliminary clauses as cannot be properly referred to any particular trade, then a list of the provisions both of money, labour, and material, and particularly observe to define the question of profit on provisions. The provisions are best kept together, not distributed through the trades.

Then the preliminary of each trade. A part of this can be obtained from the bill of the trade, and will consist of a description of materials. Follow with any directions which apply generally, as "all iron butts to be wrought," "all window and door frames to be grooved where required to receive linings and finishings," "all floors to have glued and mitred borders to hearths," &c. It will be found that attention to this principle will save labour.

After preparing the first part of the description of each trade, the dimensions may be referred to for the rest, beginning at the first column of dimensions and going regularly through them, marking through the dimensions with a vertical line in pencil as you deal with each. The abstracts will also be of considerable service in the writing of a specification, as they will present at a glance the various works requiring description.

Begin your description with either the top or bottom part of your building (the latter is preferable as being more convenient for the contractor), and maintain the principle throughout each trade, continuing the description upwards or downwards, as the case may be.

In the case of all buildings, except very small ones, it will be the best way to describe the joiner's work floor by floor, the attempt to describe several floors together usually results in confusion.

When a large quantity of work is distributed in different parts of a building, the surveyor will usually find it most convenient to commence the clause which refers to it with the description of the material, and follow with the places in which it occurs, he can then fill them in as he finds them in the dimensions, thus:—"Glaze with 21-ounce sheet glass," "the windows and fanlights of back front, the basement windows, the windows adjoining lighting court," &c.

The following list comprises a number of items which, although necessary to a specification, have not unfrequently been lost sight of:—

*Excavator.*—If there are various thicknesses of concrete, not shown on drawings, state thickness and position, and state the width to respective walls.

If a part of the earth is to be carted away, and part deposited, clearly define the proportion or quantity.

State the various depths of excavation, if not clearly shown.

Carefully describe the course of drains, or supply a plan of them as taken.

*Bricklayer.*—If the footings are not clearly shown, describe them. If in the metropolitan area they may be described as in accordance with the Building Act, if they are so; if not, they may be described with reference to the various thicknesses of the walls, as all 4½-inch walls to have two courses, 9-inch walls three courses, &c.

Also in respect of plinths and sleepers, whether the footings of walls are widened because of them or not.

Describe in detail which parts of the work are to be built in cement. State the depths of relieving arches for various spans, &c.

Numbering each smoke and ventilating flue sometimes makes your specification clearer.

*Mason.*—The average sizes of various stones on bed where their size is concealed. The average sizes on beds and average heights of quoins to angles and jambs.

The principle upon which joggles, cramps, or dowels are to be used. Where the beds of stone are to be sunk, as sometimes in spires. The finish of the backs of stones where built into walls. The distance any stone is to be pinned into wall. The position and size of every template.

*Carpenter.*—Extent to which timbers lie on walls. The distance apart of wood bricks. If any partitions are trussed, describe the sizes of the various timbers and the bolts. State the length of all straps and bolts. The distance apart of bolts to flitches.

Scantlings of all the timbers.

*Joiner.*—Describe to what work grounds have been taken. State the finished sizes of all doors, i. e. width and height; and it is well, if the sizes of openings are figured in the drawings, to state whether they are the sizes of the doors or of the openings.

Describe all the thicknesses.

A reasonable order for each storey is floors, skirtings and dados, windows, doors, fittings, as cupboards, w.c. and bath fittings, &c.

*Founder and Smith.*—Describe how the rain-water pipes have been arranged, frequently a subject of question.

Describe the positions, lengths, and weights per foot run of all the iron joists.

*Plumber.*—Describe fall and minimum width of gutter, height of turning up of lead, width of flashings and aprons and where they are intended to be, position of cisterns, and state what apparatus each cistern supplies, the lengths of the various socket pipes and the lead they are to be made of, the weight per yard lineal of lead pipes. Describing cisterns by letters A, B, C, &c., will assist you: thus, "from cistern A with ¾-inch brass connector, fly nut and union, ¾-inch lead pipe and ¾-inch bib cock, lay on the water to sink in scullery."

*Gasfitter.*—Describe position of gas meter. Describe positions of gas fittings, or cause them to be indicated on drawings. State size of the various pipes.

*Glazier.*—Thickness of plate glass. Distance apart of saddle bars to lead lights.

And various other particulars which will present themselves to the mind of any observant person.

The foregoing list, though of course incomplete, indicates the general principle which it is desirable to follow.

It is well for the surveyor to keep in mind the fact that care in the description of the position of everything in the dimensions will very much assist the person who writes the specification.

When the surveyor has simply to correct the specification furnished by the architect, he should so amend and add to it that it shall require no extraneous explanation, except such as may be obtained from the drawings.

Avoid such clauses as these in the same specification: "all walls not described to be plastered to be twice limewhited." See "Plasterer."

"Render, float and set all walls not described to be limewhited." See "Bricklayer."

These it will be seen neutralise each other.

## CHAPTER VIII.

### PRICES.

There is no part of the surveyor's work which requires so much ability and judgment as the assessment of prices; not only should the surveyor know the value of the materials, but also the amount of time which should be spent in the production of the work; he should also be able to modify his conclusion by the quality of its finish, and should constantly bear in mind the fact that the difference between the quantity of work that a man can do and that which he does is usually great.

The foundation of all pricing must be the value of the labour and materials. The fluctuations of value of the latter from various causes are considerable, and the surveyor should watch and be familiar with all the changes of the market.

One of the essentials for the surveyor is the possession of a complete collection of trade circulars and prospectuses; these should be secured in a book of sheets of foolscap large enough to take the majority and properly paged and indexed, and the collection should be carefully revised whenever changes of prices occur.

When a bill of quantities with the prices of the estimate attached has been deposited by the builder, the pricing of any extra work is much simplified, as where there is no price which will directly apply, analogous prices can be pretty easily arrived at.

If the surveyor adopts the invariable principle of making a condition that the priced bill of quantities shall be deposited by the contractor, he will soon be in possession of much information as to prices which will be of great value in treating prices for other work under s conditions.

The young surveyor will find it an advantage to kno cost and market price of the leading item of every tra a rod of brickwork, a cubic foot of each of the common s a cubic foot of fir and oak, a foot superficial of 1-inch mahogany, and wainscot. He should be acquainted wit rough approximations to the truth which are current the relative values of straight and circular work, deal, scot, and mahogany joinery. These will help hi analogous prices pretty readily, and readiness is essenti

The element of profit will enter into every calculatio the question as to what may be considered a fair profi somewhat difficult one to settle. It is quite certain many contracts are carried out for prices which allow profit, others have resulted in considerable loss. The placed by builders upon provisional sums varies from 5 per cent., but it is very questionable whether the maj of builders realise, before sending in a tender, the centage of profit that its acceptance will ensure; they w be able to say whether the generality of the prices good or otherwise, but would not be able to fix a de percentage.

The profit obtained is usually least upon works whic offered in open competition.

Very large contracts are, because of their size, confine the competition of a comparatively small number of buil and these substantial men, who, as a rule, will not em their capital except at pretty good profits.

Mr. Lucas, in the course of the discussion upon the p read by Mr. Brassey before the Royal Institute of Br Architects, February 4th, 1878, "On the Rise of Wage the Building Trades," said, "We do not profess to carry works at less than 10 per cent. profit, and I do not be any man can do so," and it is certain that only in excepti cases does any man do so.

Where it devolves upon the surveyor to fix a profit particular items, 20 per cent. is a fair one. This is li enough when one considers the number of incidental expenses which this percentage must cover. In pricing an estimate, where all the incidental items have been allowed for in the preliminary bill, 15 per cent. is sufficient.

An intelligent and experienced surveyor, from the cubic content of a building, and a general description of its materials and finishings, can tell with remarkable accuracy what will be its cost. If the surveyor will adopt the practice of commencing his dimensions with the cubic content of the building for which he is preparing quantities, he will be, in course of time, in possession of some valuable material for comparison of relative costs. These measurements to be of any value must always be done in the same manner, and must comprise the whole content, including the walls. Disregard chimney-stacks, buttresses, and dormers, unless in unusual number.

The most usual practice is to multiply the outside length of the building by the breadth, and the result by the height from the bottom of the footings to half way up the roof. A different price per foot may be required for the various parts. For boundary walls and such works, an approximate estimate should be made.

Various causes will operate to modify the price per foot, as very expensive finishings, a considerable proportion of basement, difficulty of getting materials to the site, an unusual quantity of boundary walls or drains. In such a case, the surveyor commences with his estimate on the general principle above described, and adds the extra cost of such things as those last mentioned. It should be observed that small buildings cost more in proportion than large ones, the finishings being of similar character.

Dwelling-houses of the commonest character (such as the work of speculating builders) can be built for 5*d.* per foot cube, and the cost of dwelling-houses ranges from this price to about 16*d.*, the price of the most expensive mansions; warehouses of plain character cost 5½*d.* to 6*d.*; stables from 5*d.* to 1*s.*; breweries 5*d.* to 7*d.*

The cost of the buildings erected by Sir S. Waterlow's

Company has averaged 7*d.* per cubic foot, the minimum being 5*d.*, the maximum 8*d.*

There are some other methods of arriving at the probable cost of a building by comparison—

The price per superficial square (100 feet) for each floor for dwelling-houses. Thus, 8*d.* per foot cube would be commonly equal to 40*l.* per square, assuming the rooms to be 12 feet high, &c.

The price per stall of stables (without lofts) varying from 25*l.* to 100*l.*

The price per bed for hospitals from 50*l.* upwards. St. Thomas's Hospital cost 650*l.* per bed, but reckoning one pavilion, without the administrative buildings, 250*l.* per bed. The Herbert Hospital, including administrative buildings, 320*l.* per bed.

The price per sitting for churches with a satisfactory tower and spire is seldom less than 10*l.*, more often 12*l.*, and observe that about 8 square feet is the minimum proportion of the area for a sitting.

The price per sitting for the usual Dissenting chapel is seldom less than 4*l.*

The price per scholar for schools from 5*l.* The London School Board schools have cost for the buildings about 8*l.* per head.

The tabulated results of Mr. Christian's calculations of the comparative values of the buildings designed in the competition for Edinburgh Cathedral, appended to his report (see the 'Architect,' February 22nd, 1873), are valuable, and the more so because most of the designs were published in the professional newspapers.

The cost of work done in the country, if local labour be employed, will usually be from 5 to 15 per cent. less than the same kind of work done in London.

In the absence of information founded on the cubic content of a building similar to the proposed building, an approximate estimate will be the only means of discovering the cost. In such a case avoid going much into detail. The process will be a rough imitation of taking out the quantities.

Measure the brickwork, including all the labours, arches, facings, &c., stone, including all its labours, the floors as flooring and timbers, in one item, the partitions, as timber and plastering, in one item, the roofs as timbers, boarding, and slating, in one item, &c. For the openings, make a calculation of the average cost of each, including everything, as dressings, joinery, glass, &c., the general principle for taking out quantities being to dissect the work as much as possible, for an approximate estimate to concentrate it into single items. When the building is a very large one, and of great height, it must be remembered that some parts of the work, although of the same material and finish, will be of greater value than others because of their position.

Similarly, when you are making an estimate for a builder, you may, if pressed for time, price it on your abstract and carry the amounts to a summary; the bill may never be wanted, but can be produced whenever you desire.

Tables of the approximate quantity of fir in a square of roof, floor, or partition, may be found in 'Laxton's Price Book.'

The cubic content of the building will, however, be a useful check upon an amount arrived at in this manner.

It is not usual to abstract the notes, they can be priced on the dimension paper, putting one column of dimensions only on each folio and leaving the other blank for pricing.

The value of labour can only be arrived at by close observation and long experience. Some results of this observation have been tabulated and published as 'Constants of Labour,' by Mr. Peter Nicholson, whose data refer exclusively to carpentry and joinery; and others relating to all trades, by Mr. Hurst in his 'Handbook for Architectural Surveyors.' The writer has tested many of these latter and found them to be in the main correct. There is no doubt that pricing in a really scientific manner must be conducted upon that principle. These are all calculated on the assumption that a man works ten hours per day, the present general usage being as follows :—

| | Summer.<br>Hours. | Winter (commencing on the first Monday of November and continuing 12 weeks).<br>Hours. |
|---|---|---|
| Monday.. .. .. | 9 | 8½ |
| Tuesday .. .. | 9½ | 8½ |
| Wednesday .. .. | 9½ | 8½ |
| Thursday .. .. | 9½ | 8½ |
| Friday .. .. .. | 9½ | 8½ |
| Saturday .. .. | 5½ | 4½ |
| Per week .. | 52½ | 47 |

But this difference presents no difficulty, as it is only to adopt the value of ten hours' labour at the rate per hour and multiply it by the decimal given in the table. Where machinery is used for joinery, the cost of work will be much less if in large quantities, but if the quantities are small, the saving is hardly worth consideration.

The general London rates are as follows:—

| | Per hour. | Rates commonly allowed in day accounts. |
|---|---|---|
| Excavators .. .. .. | 6¼*d.* | 7½*d.* |
| General Labourers .. | 5¾*d.* | 7*d.* |
| Scaffolders .. .. .. | 6¼*d.* | 7½*d.* |
| Bricklayers.. .. .. | 9*d.* | 10½*d.* |
| Masons .. .. .. | 9*d.* | 10½*d.* |
| Fixers .. .. .. .. | 9½*d.* | 11*d.* |
| Carpenters .. .. .. | 9*d.* | 10½*d.* |
| Joiners .. .. .. | 9*d.* | 10½*d.* |
| Smiths.. .. .. .. | 9*d.* | 10½*d.* |
| Plasterers .. .. .. | 9*d.* | 10½*d.* |
| Painters and Glaziers | 8½*d.* | 10½*d.* |
| Plumbers .. .. .. | 10*d.* | 1*s.* |
| Plumbers' Labourers | 6½*d.* | 7½*d.* |

Fares, or cost of lodging, are usually charged when the work is more than four miles from contractor's shop.

As an instance of the use of "constants," the calculation of the cost of labour upon a foot superficial of 2-inch four-panel moulded one side door would be as follows:—

10 hours, joiner = 7*s.* 6*d.* = 7·5
Constant .. .. ·103
Cost per foot for labour .. .. ·7725 = 9¼*d.*

The drawings should always be examined before pricing an estimate, as however well the quantities may have been prepared, a sight of them will generally affect the surveyor's conclusions.

The quantity of the work contemplated must materially modify the price. Work in small quantities should be priced at a higher rate, work in large quantities at a rate proportionally lower. It should be observed that when a large quantity of a particular *material* is required, specially low quotations may be obtained from manufacturers. In many cases, as for slating, ironwork, glass, &c., a builder in preparing his estimate sends a copy of the bill of such part of the work to a firm, or several firms, of slaters, founders, or glass merchants, and adopts the price furnished by one of them, with the addition of a small percentage. The same course is frequently available for the quantity surveyor, and will save him much trouble.

The surveyor, in pricing a bill of quantities, should make himself familiar with the manner in which they have been prepared, concrete being sometimes described as including staging; excavation, as including strutting and planking; brickwork, as including all relieving arches; facings, as including many of the cuttings, as extra on common brickwork, as extra on facing of a commoner kind, &c.; stone, including labours; carpentry and joinery of finished sizes, &c., and it is obvious that such conditions must modify the rates.

It will be seen from the foregoing remarks that but little dependence is to be placed upon price books; the special circumstances must always materially modify an estimate.

In the calculation of the value of a foot superficial of work it will usually be best to compute the value of a larger quantity, and from that calculate the smaller, as when the difference in price between a superficial foot of square framed and moulded door 3 feet by 7 feet is required, the whole of the moulding on both sides being collected and a value placed upon it, the result when divided by twenty-one will give you the amount per foot superficial to add to the original price.

For all work there will be various preliminary charges to be allowed for. In the metropolis there will be district surveyors' fees, settled by the schedules of the Building Act.

Fees for the parochial surveyor for hoarding, connection with sewer, taking up, and making good paving, &c., to be obtained by enquiry at the office of the local board.

### *Water for the Works.*

In London it will not unfrequently be found the cheaper plan to sink a well, otherwise the price of water will be in accord with the printed tariff, "Water supply for building purposes," published by each water company.

Some companies supply by meter, reducing the rate in proportion to the increase of quantity; others make their charge in accordance with the value of the projected building, but the rate varies considerably with the different companies.

The New River Company's tariff is a fair example, their charges being for a building estimated to cost 100*l.*, 10*s.*, increasing by 10*s.* per cent. up to 400*l.*; estimated cost 500*l.*, 45*s.*; 600*l.* to 700*l.*, 50*s.*; 800*l.* to 900*l.*, 60*s.*; 1000*l.* to 1200*l.*, 70*s.*; above 1200*l.*, 5*s.* per cent. additional.

### *Provisions.*

5 to 10 per cent. is usually put upon sums provided, except that for extra works, or other work which will be measured, the price for which will include a profit.

### *Excavator.*

The value of the excavator's work will depend upon the nature of the soil. Observe whether the earth is deposited on the site; and if so, how many runs it is wheeled; or if basketed or carted away. In the latter case the surveyor must ascertain the position of the nearest place where the rubbish may be shot, and whether there will be any charge for the permission to shoot it, and the charge per load for cartage. Observe that the increase in bulk upon the measured quantity of excavation will affect the carting; for instance, one-fourth if earth or clay, about one third if chalk, about one-half if rock.

By inquiry in the neighbourhood, or inspection of the site, the experienced surveyor will be able to judge whether or not sand will be found; if it is, and there is no stipulation in the specification that sand shall not be dug, the builder will thus obtain the sand for nothing, and save the carting of so much earth from his trenches as the pit formed by the removal of the sand will contain.

Where there is a large quantity of carting it is often advantageous to obtain an estimate from a local carman.

Value of *lime concrete* per yard cube:—

| | | £ | s. | d. |
|---|---|---|---|---|
| 1¼ yards of ballast at .. .. | | | | |
| ⅙th yard of ground lime at | | | | |
| Labour and use of stages .. | | | | |
| Water .. .. .. .. .. | | | | |
| Add profit per cent. .. | | | | |
| Value per yard .. .. | £ | | | |

Concrete per yard superficial of certain thickness, say 6 inches, would be ⅙th of the value of a cubic yard, plus a small increase for extra labour in spreading.

In the case of drain pipes the amount of discount off the published list of the manufacturer is:—

For pipes up to 12 in., 40 per cent.
Ditto, 15 to 18 in., 30 per cent.
Discount for cash, 2½ per cent.

The discount off other pottery varies from 10 to 15 per cent., and is delivered free of charge within a radius of five or six miles of the manufacturer's premises.

In pricing bills of excavation, observe whether it is described as to include strutting and planking.

### *Bricklayer.*

To ascertain the value of brickwork:—

The price of the bricks in the field will be the first consideration, then the means of carriage to the works; if by barge, the cost of loading, freight, unloading, and carting from wharf to the works.

If simply carted from the field, loading, carting, unloading.

The price of sand per yard delivered, cost of screening, if screening is necessary.

The price of lime per yard delivered; the quality of the work.

Value of *brickwork* per rod reduced; height of four courses with their joints 12 inches:—

| | | £ | s. | d. |
|---|---|---|---|---|
| 4300 bricks, at per 1000 .. | | | | |
| 3 yards sand .. .. .. | | | | |
| 1¼ yards lime .. .. .. | | | | |
| Water .. .. .. .. .. | | | | |
| Scaffolding .. .. .. .. | | | | |
| Labour .. .. .. .. .. | | | | |
| Add profit .. .. .. | | | | |
| Value per rod .. .. .. | £ | | | |

It will be found generally that a price obtained in this manner will exceed any price which comes before the surveyor in competition. This is to be accounted for by the fact that the builder almost invariably saves much of the mortar by putting a very small (inadequate) quantity in the cross joints, and uses a smaller proportion of lime, mixes grizzles, or place bricks, with the stocks, and possibly makes a sub-contract for the labour, which results usually in his getting it below the market price; the quality of the bricks is also often below that prescribed.

The value of facings will depend upon the kind of bond, as there will be many more headers in old English bond than in Flemish.

The builder keeps down his cost by using only half bricks as headers, instead of whole ones, introducing a whole brick as a bonder occasionally.

Other points to be observed in the valuation of items of facings are, whether the work is pointed as it proceeds, or raked out and pointed afterwards; whether it has been measured as "extra on common brickwork," or "extra upon another kind of facing."

The trade discount off published lists of chimney-pots is 15 per cent.

Ditto, architectural terra cotta, 10 per cent.

Discount for cash, 2½ per cent.

In pricing of brickwork, much time may be saved by using 'Laxton's Bricklayer's Tables.'

### *Mason.*

The principal points to be noted in the valuation of stonework are the cost of the various sizes, the quarry regulations, the distance of the place at which it is delivered, cost of cartage, and cost of labour. Where stone is brought by sea, allow the cost of unloading, and further carriage, by truck or barge.

To take Mansfield stone as an instance.

There is the difference of price between white and red, random blocks, selected blocks, selected blocks sawn to dimensions.

In Ancaster stone the price varies with the thickness of the bed.

In Craigleith and many other stones with the number of cubic feet in the block.

In some cases a saving is effected by getting the stone worked at the quarry, or where a large quantity of similar moulding has to be done, by the use of the stone moulding machine.

Where a large quantity of stone is required, the builder usually obtains a special estimate from the quarry or its agent at a considerable reduction from the usual prices.

In pricing, a certain percentage must be allowed on all stone for waste, notwithstanding the recognised system of measuring the size of cube stone, generally considered to be about 5 per cent. on Bath stone, but varying with the character of the work.

Where stone has been measured per foot run stone and labour, and there are various scantlings with the same relative labour, the prices are generally arrived at by comparing the sectional area in inches. Thus:—A 12-inch by

6 inch step, tooled and back jointed, 72-inch sectional area, would be worth about the same price as one 9 inches by 8 inches, also 72-inch area. When the labours vary, the foundation of the calculation must also be the sectional area and the proportion it bears to the foot (144 inches).

The value of templates will also be readily obtained by observing what proportion their area bears to a foot superficial.

And generally, if one settles the price of a cubic foot of rubbed, tooled, or sawn stone before beginning to price the items of a bill, there is but little difficulty in fixing the relative values of the items.

Usual trade terms 2½ per cent. for cash

Where the labours appear in a bill of quantities, although you may feel satisfied as to the value you put on the cube stone, price out the labours in order to compare them with your conclusions.

### *Slater.*

The value of slating will depend upon the kind of slates, the gauge, and the kind of nails used. A small allowance should be made beyond the actual number of slates required for those which may be broken in transit or on the works.

Saving is effected by builders by reducing the lap where it can be reduced, using cheaper nails, and only one to each slate instead of two.

The usual trade terms are acceptance at three months, or 2½ per cent. discount for cash or monthly account.

Value of *slating* per square, say Countesses, 20 inches by 10 inches laid to a 3-inch *lap and copper nailed*:—

| | | £ | s. | d. |
|---|---|---|---|---|
| 170 slates, at per thousand (of 1200) .. .. .. .. .. .. | | | | |
| 10 slates (for waste) ditto .. .. | | | | |
| 2¼ lb. of 1½ in. copper nails .. | | | | |
| Cartage .. .. .. .. .. .. | | | | |
| Slater and labourer .. .. .. | | | | |
| Add profit .. .. .. .. | | | | |
| Value per square .. | £ | | | |

### *Carpenter.*

The ignorance which exists in the profession generally as to the quality and value of timber and deals, offers to the builder considerable facilities for the increase of his profits by the substitution of inferior materials.

In some conditions of the market the use of deals instead of timber will effect a saving, so many various scantlings being now brought into the market: much sawing is thus saved, and the risk of loss involved by the liability to rejection of timber after it is converted, and the waste of outside slabs, &c., is avoided.

All calculations of the value of carpentry must start with the price per cubic foot of the timber, thus:—

| | | £ | s. | d. |
|---|---|---|---|---|
| Fir timber per load .. .. .. | | | | |
| Cartage . .. .. .. .. .. | | | | |
| Sawing into joists, rafters, &c. .. | | | | |
| Waste, 5 ft. per load, if not sawn die square half that quantity | | | | |
| Add profit .. .. .. | | | | |
| | £ | | | |

This total, divided by 50, gives the price per foot cube.

Very small scantlings will be of greater value consequent upon the greater quantity of sawing.

Observe whether or not the sizes are to be finished sizes.

### *Joiner.*

In the pricing of joinery it should be observed whether or not it is to be of finished sizes, whether the mouldings are worked on solid or worked to detail, as the increase of cost is considerable in cases where mouldings cannot be obtained from a manufacturer's stock.

Take care to preserve a reasonable analogy between your prices. In framings, for instance, start with a certain value for square framing, and add to that the various further labours upon the piece of work in question. Estimators sometimes disregard all the extra labours when pricing a bill, putting such price on the superficial items as will cover them.

The value of deals will be the basis of all your calculations, and the surveyor should understand the various standards.

| | £ | s. | d. |
|---|---|---|---|
| 120 deals, 12 ft. by 9 ft. 3 in. (London standard) .. .. .. .. .. .. | | | |
| Carriage .. .. .. .. .. .. .. | | | |
| Sawing .. .. .. .. .. .. .. | | | |
| Waste .. .. .. .. .. .. .. | | | |
| Add profit (where the price per foot is merely calculated for use in pricing of finished work, the profit should be placed upon the latter) .. .. .. .. .. .. | | | |
| | £ | | |

The total divided by 1080 gives the price per foot superficial of 3-inch deal.

Where the price is calculated for day account, waste need not be considered; where for finished work $\frac{1}{10}$th is a fair average allowance; where finished sizes are specified $\frac{1}{8}$th should be allowed.

### *Ironmongery.*

The trade discount on ironmongery varies from 15 to 30 per cent.

Screws, 70 per cent. off list prices.

### *Plumber.*

The surveyor should observe how the labours in this trade have been measured; some surveyors making many more items of extra labour than others, which will of course make a difference in the prices.

As lead is now rolled in a great variety of thicknesses, the surveyor will, in measuring, find it good policy to test the weight, when he will possibly meet with the curious phenomenon of 3½ lbs. and 4½ lbs. lead where he had least reason to suspect its use. Weights of pipes should also be tested, "middling" sometimes being put in place of "strong," and composition pipes instead of lead.

The trade discount on plumbers' brass work is from 10 to 15 per cent.

Discount, 2½ per cent. for cash.

Discount on sanitary goods, as w.c.'s and lavatories, 10 per cent.

The allowance for waste on old lead varies from 4 lbs. to 6 lbs. per cwt.; but 4 lbs. is that most generally adopted.

### *Plasterer.*

The chief differences in the quality of plastering are produced by the use of deficient quantity of lime, inferior sand, inferior quality and thickness of laths, deficiency of hair (quantity and quality), saving of nails by overlapping the laths, &c.

VALUE OF ONE YARD RENDER AND SET.

| | | £ | s. | d. |
|---|---|---|---|---|
| Chalk lime, 3/10 of a foot cube .. | | | | |
| Sand, 3/5 " .. | | | | |
| Hair, ¼ lb. .. .. .. | | | | |
| Plasterer, labourer, boy .. .. | | | | |
| Add profit .. .. .. | | | | |
| Value per yard .. .. | £ | | | |

### *Founder and Smith.*

The quality of iron, and consequently the price, varies greatly.

Observe whether rain-water pipes and gutters have been measured net or by the yard, and regulate the price accordingly.

For large quantities of ironwork special prices may be obtained.

Note the way in which iron joists, girders, &c., have been measured, whether the hoisting is included or separately stated.

Iron cisterns are increased in value if not of stock sizes.

The trade discount off stoves and ranges is usually 20 to 25 per cent.

The basis of all pricing of smith and founder's work must be the weight of the article, and this ascertained, the comparative values of the labour on each are easily adjusted.

### *Gasfitter.*

The trade discount off list prices of iron gas tubing is variable from 50 to 65 per cent. Off list prices of pipe fittings, as sockets, elbows, tees, crosses, &c., an additional 2½ per cent.

And a further discount for cash of 2½ per cent.

The discount off list prices of gas fittings is usually about 25 per cent.

Observe in pricing whether the pipe has been measured to include tees, bends, and connections, whether it includes cutting away and making good, whether it includes painting the pipes.

### *Glazier.*

The pricing of glazier's work requires no special remarks.

Observe whether or not the measurement of plate-glass is to include beads.

On large quantities of glass there is a trade discount of 20 per cent. for cash.

The usual plate-glass tariffs are subject to a trade discount of 25 per cent. The low prices in this trade are sometimes to be accounted for by the substitution of sheet-glass of weight inferior to that specified or the use of sheet-glass instead of plate.

### *Painter.*

In this trade inferior oils and white-lead, and the use of other materials instead of white-lead, the dilution of varnish with turpentine, boiled oil, &c., are means by which the cost of work is reduced.

### *Paperhanger.*

The trade discount on wall papers is in the majority of cases one-third of the marked price, or about 33 per cent., but sometimes as much as 55 per cent. Some of the firms which produce the more artistic wall papers give no trade discount.

*Pricing of Day Accounts.*

In pricing day accounts, surveyor must remember that the greater part of materials have been supplied in small quantities and are consequently worth more than in large. Nails, screws, small quantities of painters' colours, single articles, &c., are usually worth a price equal to that charged by the general retail trades.

This treatment will apply if the work properly measurable has been excluded from the day account.

# CHAPTER IX.

## THE LAW AS IT AFFECTS QUANTITY SURVEYORS.

THE mixture of common law and custom of the trade has tended to a complication of the relations between surveyor, builder, and building owner, and the want of familiarity of the average solicitor with building contracts renders it incumbent upon the majority of quantity surveyors to make themselves familiar with those general principles of law which specially affect their professional duties and responsibilities.

And this fact has been so generally admitted that suggestions have been made for the establishment of a court specially for the settlement of questions affecting buildings and cognate subjects. The portentous combination thus indicated of lawyer and surveyor in one person does not at present appear practicable, but is none the less desirable.

The custom of the trade bears a large share in defining the legal construction of any contract which may affect the quantity surveyor, and such custom is assumed by law to become (in the absence of any condition to the contrary) a part of the contract; but a custom to be good must be certain, and it must be clearly proved to exist and to be general and notorious. Nevertheless, any trade custom may be set aside by special arrangement.

The much vexed question, Shall the quantities form a part of the contract? is one which materially affects the quantity surveyor. Sir Edmund Beckett says (in 'A Book on Building'), "there is another intermediate element or document which in modern times has assumed great importance, though the employer generally knows nothing of it, *nor (be it remembered) is it any part of the contract legally, and nothing* *but confusion arises from recognising it as such*, though it may sometimes be referred to for information—that is, the bill of quantities of every kind of work throughout the building." And, again, "I advise employers not to let the quantities be taken by anyone who can be made out to be their agent, nor to recognise them in any way, except as after mentioned, with reference to a schedule of prices for extras.' Others assert that, if the quantities form a part of the contract, the amount to be paid by the building owner is always uncertain until the building is completed, and that such arrangement takes away, to a large extent, the feeling of responsibility which a surveyor has for the accuracy of his work.

The strongest argument for the adoption of the quantities by building owner is the justice of that course. The employer should obtain neither more or less work than is included in the quantities, and it is believed that this would be the desire of the majority of employers. The assumption of the loss of feeling of responsibility by the surveyor is unfounded, the surveyor's responsibility being the same whether the builder or building owner pays him. The solicitude as to error on the part of the quantity surveyor is also, to a great extent, mistaken, for when a properly qualified surveyor prepares quantities, he makes remarkably few mistakes; the mistakes in quantities are usually made by persons who have but small right to be called quantity surveyors, and have not been specially trained for the work. It may also be remarked that claims for deficiencies in quantities are sometimes paid by the quantity surveyor, but they are very much more frequently included in "additions" at the adjustment of accounts, and the surveyor would, in such a case, take special trouble to look for items of possible excess as a set-off. And, although when the quantities are not a part of the contract the builder may legally refuse to allow them to be consulted (taking his stand upon what plans and specification alone indicate), yet in the majority of cases they are adopted as the basis of settlement.

There is thus considerable show of reason in the contention that the quantities should usually form a part of the contract, for they are in the majority of cases practically so.

The making the quantities a part of the contract would tend to abolish the absurd practice of an architect taking out quantities and disclaiming responsibility for their accuracy, which has resulted in the anomaly of the contractor being under the necessity of going through all the dimensions and checking the quantities before signing the contract (usually impossible) or taking them as correct—the architect often receiving for such work as this an equal percentage to that charged by surveyors who take the responsibility of accuracy.

The making the quantities a part of the contract and the elimination of "sporting items" as they are called, will also reduce prices. Uncertainty induces estimators to add sums to cover possible contingencies.

The rights of the quantity surveyor, in the absence of express agreement, are as follows:—

The architect having disclosed building owner's name (that name on the drawings and specification being sufficient), and having been instructed to obtain tenders is, by that instruction, empowered to have the quantities prepared. If the work goes on the contractor is liable to the surveyor for his charges by virtue of custom of the trade. If the work does not go on, the building owner is liable; settled by decision in the case of Moon *v.* Guardians of Witney Union.

3 Bingham, New Cases, page 814, which is shortly as follows:—

Kempthorne, architect to the guardians, prepared plans and specification, and instructed Moon to prepare quantities. The drawings and specification were deposited with the clerk to the guardians, with a copy of instructions for the builders, which ran thus:—"The builders desirous of contracting for the erection of the Witney workhouse are informed that the quantities of the works are now being taken out for their use and will be ready by the 28th inst. Builders requiring a copy of the same are requested to leave their names, with the sum of 2*l.* 2*s.*, at Mr. Kempthorne's office, or at Mr. Leake's, Clerk to the Union, Witney, before 26th inst. The successful competitor will have to defray the expenses of taking out the quantities, the charge for which will be stated at the foot of the bill of quantities when delivered." A dispute arose between Kempthorne and the guardians, and they refused to go on with the work. Kempthorne sent in his bill with Moon's bill appended. They paid Kempthorne's bill, and refused to pay Moon's charges. They had never heard of Moon till the account was delivered. Moon proved the usage for architects to employ surveyors to prepare quantities, and that the successful contractor included the charge in the amount of his tender. Jury gave verdict for the plaintiff.

A *rule nisi* was obtained to set aside this verdict and enter a nonsuit, or to have a new trial, on the grounds that no privity had been established between the plaintiff and defendants, that the usage was not binding on defendants, and that the usage had not been sufficiently proved. The judges held that the defendants were liable

Lord Chief Justice Tindal said:—

"The question was whether Kempthorne, as agent for the defendants, had any authority to bind them in a contract with plaintiff."

"The jury found that there was a usage in the trade for architects or builders to have their quantities made out by surveyors. Then the defendants themselves had an intimation that such was the practice, for Kempthorne wrote to Leake, the defendants' attorney, and Leake gave out that the successful competitor should defray the expenses of taking out the quantities. If this was to be so, what was to be the result if by the defendants' fault there was no successful competitor, because there was no competitor at all? In such a case the defendants must be liable for the amount of a charge which they have authorised their builder to incur."

"Then, when, upon their refusal to proceed, Kempthorne sent in his account, comprehending the charge for the surveyor, they had express notice of the existence of the charge. They came to an agreement with Kempthorne, in respect of his own demand, to pay a sum which could not comprehend

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Waghorn *v.* Wimbledon Local Board of Health, Queen's Bench Nisi Prius, reported in the 'Times,' June 4th, 1877, introduces a somewhat different element.

The defendants are by statute the burial board as well as local board for the district of Wimbledon.

Defendants, at a meeting of the board, passed a resolution which embodied instructions to their surveyor, Rowell, to prepare plans and specification and procure tenders for the erection of a cemetery chapel.

Rowell prepared the drawings and specification and instructed Waghorn, quantity surveyor, to prepare quantities; these were sent to the builders in the usual way, and builders tendered upon them. The estimate being beyond what the board desired to spend, none of the tenders were accepted, and they refused to pay Waghorn's charges. The defendants pleaded that they never authorised Rowell to employ plaintiff.

His Lordship ruled that as they had instructed him to procure tenders, and as tenders could not be made without quantities, they had impliedly authorised him to get the quantities taken out.

It was then submitted that the defendants, being a corporation, could only contract under seal, and there being no contract under seal here, the plantiff could not recover. His Lordship ruled that as the defendants had, by resolution, impliedly authorised Rowell to get the quantities taken out, and had the benefit of the work which had been done, their objection was not tenable.

Judgment was accordingly entered for the plaintiff for the amount claimed.

Taylor *v.* Hall, Irish Law Reports 4, Common Law, 467 (1869–70), illustrates another point which arises not unfrequently.

Walsh, building owner, wished to make alterations to his house, and communicated with Hall, a builder, who prepared a plan and estimate. Walsh, being dissatisfied therewith, instructed Fogarty, architect, to prepare drawings and specification, and obtain tenders. Fogarty instructed Taylor, quantity surveyor, to prepare quantities; these were sent to builders, one of whom was Hall. Hall's tender was the lowest, but greatly in excess of the amount Walsh desired to spend. Taylor thereupon prepared a bill of reductions and sent it to Hall, who modified his estimate; the amount of this reduced estimate was also too large, and was not accepted. At an interview, shortly after this, Taylor cautioned Hall that if he obtained the work on any modified plan, he would still be liable for the charges. Hall answered that he would feel himself liable and would apprise Mr. Walsh of it.

Walsh then employed Hall to carry out a modification of his original plan under a contract by which it was agreed between the owner and Hall that the latter should not be liable for Taylor's charges.

Taylor thereupon brought an action against Hall for the charges, maintaining that the plan adopted was a mere modification of Fogarty's reduced plan.

Taylor's witnesses stated that there was the strongest similarity between the work as carried out and Fogarty's reduced plan.

Hall's foreman stated that the works were carried out according to a reduction of Hall's original plan, and that Taylor's calculations were not used to produce the accepted tender.

Chief Justice Monahan said that, according to the usage of the trade, if the owner discarded the architect's plan he was liable to the surveyor, the architect having the express or implied authority of the owner to employ him; that the builder who carried out the new plan, though he might have tendered under the old plan, was not liable if he did not use the surveyor's calculations; and that the contract here not being any modification or continuation of the original contract which was in negotiation with defendant, but an entirely new, independent contract by the present defendant in his own right, he was not liable, the uncontradicted evidence of his foreman, who acted for him, being that the plaintiff's calculations were not used.

Held that Taylor could not recover.

In this last case the agreement made by Walsh with Hall did not affect the decision, nor did Walsh by that agreement make himself liable, for he was already liable, and the action should have been brought against him.

In cases of measuring extras and omissions, the builder is liable for the charges, and on the same principles, the charges being usually added to the builder's account.

All the foregoing cases derived their force from custom of the trade. The following cases depend upon special arrangements which nullified the effect of custom.

If an architect instructs a surveyor to prepare quantities not disclosing his client's name, or acting without his client's authority to obtain tenders, or having made an arrangement with his client to prepare drawings, specification, and quantities for a given sum, he thereby makes himself personally liable for the charges, and the architect may so act as to give strong reasons for the assumption that he has made a personal contract by his acts, as, for instance, paying money on account of the work.

A case in point is as follows:—

Burnell *v.* Ellis, Common Pleas, a short report of which may be found in the 'Times,' 25th June, 1866, and the 'Builder,' 30th June, 1866, the substance of which is as follows:—

Ellis, architect, was employed to prepare plans and specification for an hotel and stables proposed to be erected by a company. He employed Burnell, surveyor, to prepare quantities. The estimates being higher than was expected the intention of erecting the buildings was abandoned. Plaintiff said his charges were 100*l.*, but as the work did not go on, and defendant did not expect to get all he was entitled to, he asked plaintiff to reduce his charge; this he did, agreeing to take 50*l.* The evidence showed that defendant had paid plaintiff 10*l.* 10*s.*, which plaintiff asserted was on account, and which defendant said was a loan, and further, that the plaintiff was engaged to do the work by Hall, a builder, and that it was understood that he was to look to the company for payment.

The jury found a verdict for the plaintiff.

Another case bearing upon this part of the question is—

Richardson and Waghorn *v.* Beales and others. Common Pleas, Nisi Prius. Reported in the 'Times,' June 29th, 1867.

Beales and other gentlemen formed themselves into a committee to establish a club, to be called the New Reform Club, and obtained designs in limited competition for the building. Porter, architect, was the successful competitor. Porter instructed Richardson and Waghorn, quantity surveyors, to prepare quantities. Tenders were obtained. The amount being too large, the intention of building was abandoned. Richardson and Waghorn applied to the committee for their charges, and payment being refused, brought their action.

The architect, on being examined, stated that he had received a communication from the committee informing him that his design was accepted, and desiring him to get in tenders provided he did not pledge the liability of the committee in so doing.

The Lord Chief Justice expressed a strong opinion that this letter put plaintiffs out of court, and that the architect was the proper person to be sued, but said he would leave the evidence to the jury.

Upon this plaintiff's counsel elected to be non-suited.

Also Gordon *v.* Blackburne. Lord Mayor's Court. Reported in the 'Builder,' February 1, 1879.

Blackburne, architect, prepared drawings from directions given by a third party, and instructed Gordon, quantity surveyor, to prepare quantities. Blackburne had not been instructed to obtain tenders, and, moreover, in Gordon's previous transactions with Blackburne he had received the charges through him; nothing was said about the client when he received instructions, there was no specification and nothing on the drawing but "Leftley's Villa." The quantities were prepared and lithographed, the copies being sent to Blackburne, and by him forwarded to the builders.

Plaintiff shortly after applied to defendant for money on account, which defendant refused to pay, stating that he had a difficulty with his client, but that his client was liable for the charges.

The Judge, in addressing the jury, said they would consider if there was any relation between the parties, other than the ordinary one which subsisted between architect and surveyor. Plaintiff said there was a personal employment and promise to pay; they would say whether that was so. Was the plaintiff made aware that defendant was Leftley's architect, or was the evidence sufficient to prove that he was making a personal contract?

Verdict for the plaintiff, the jury assuming that defendant had personally employed plaintiff acting as principal.

The responsibilities of the quantity surveyor in the absence of express agreement are as follows:—

When a contract is proceeded with, and the builder discovers loss consequent upon deficient quantities, the surveyor is liable for the amount of such loss, but the surveyor may, if he is able to discover them, plead as set-off errors of excessive quantities. If no such set-off can be produced the builder may usually be induced to accept the mere cost price of the work involved in error.

This liability is founded upon the principle that the surveyor is responsible to the person who pays him for any loss suffered by such person consequent upon the surveyor's want of care or skill, and this application of the principle is generally admitted, and is countenanced by the number of cases in which surveyors have paid such claims.

Scrivener and another *v.* Pask, Law Reports 1, Common Pleas, 715, is a case in point.

The circumstances were as follows:—

Pask, desiring to build a house employed Paice to prepare plans and specification and obtain tenders. Paice prepared quantities (thus placing himself in the position of quantity surveyor). Scrivener tendered on these quantities. His tender was accepted, and he paid Paice his charges. The quantities proved deficient and Scrivener sued Pask for he amount of the deficiency.

Justice Blackburn said:—

"To entitle the plaintiffs to recover they must make out three things: That Paice was defendant's agent; that Paice was guilty of fraud or misrepresentation; and that the defendant knew of it and sanctioned it. There is no evidence here of either of these things. *If there has been misconduct upon the part of Paice the plaintiffs have their remedy against him.*"

An architect who supplies quantities for his own works is in a like position with the independent quantity surveyor.

The quantity surveyor is bound to furnish a copy of dimensions to the person who pays him.

The responsibilities of the quantity surveyor in cases of express agreement are dependent upon such agreements, and are consequently various.

When the building owner arranges to pay the quantity surveyor's charges, the quantity surveyor is liable to the building owner for the value of any error, and there is little doubt that the quantities by virtue of that arrangement become a part of the contract, and the building owner is liable to the builder.

Sometimes the building owner stipulates that the surveyor shall also be liable to the builder for inaccuracies.

An architect who prepares quantities under a similar arrangement places himself in the position of the independent quantity surveyor.

Surveyor acting as an appraiser, as in valuing dilapidations, should have an appraiser's license.

# CHAPTER X.

## ORDER OF TAKING OFF IF THE OLD METHOD BE ADOPTED.

It will be seen that the trades are separated to accord with the finished bills. As the only recommendation of this course is the facility of collection into single items, and consequent saving of labour in squaring and abstracting, see that this advantage is not lost, and therefore keep additions and deductions respectively as much as possible together, so as to get as few items on your abstract as may be, generally taking all the additions of an item of work first, and then all the deductions.

Some surveyors who adopt this method commence by heading sheets of dimension paper with the titles of each trade so that when they come to an item of a trade other than that upon which they are engaged, and which may possibly be forgotten if left to be taken with the trade to which it belongs, they put it at once on its proper sheet, as when measuring a roof truss the templates are at once written on the sheet headed Mason, and the bolts and straps on the sheet headed Founder and Smith.

Many surveyors begin every trade with the lowest floor, working upwards, acting on the assumption that any necessary expedient of construction can be thus introduced with less trouble than in working from the top of the building downwards. This argument will only apply so far as the carcase is concerned, but whether working upwards or downwards the same order should be maintained by the surveyor in all cases, and with all the trades.

In taking off the work by trades, some persons prefer to commence with the joinery, as they maintain that they thus carry on the work and acquire a familiarity with the drawings at the same time.

A common modification of this method is in the case of openings. The surveyor commences with the joinery and completes the work, both additions and deductions, to the openings in all trades, except when the fronts of the building are of stone or cement, in which case he leaves the masonry or cement work of the openings to be taken with the work to front; on this system openings without joinery are taken with the general brickwork.

*Excavator and Bricklayer.*

Surface excavation.
Trenches and concrete.
Basement trenches.
First external, then internal walls, keeping them separate.
Strutting and planking.
Footings.
Brickwork complete for basement.
Cuttings and extra labours, basement floor.
Deductions, windows, doorways, recesses
Fender walls.
Sleeper walls.
Trimmer arches.
Window frames, bed and point.
Door frames, bed and point.
Flues, parget and core.
Arches, and their cuttings internal and external.
Vaulting.
Pavings.
Extra only in cement to brickwork.
Damp-proof course.
Bricklayer's work to each floor in the same manner and order.
Chimney shafts.
Chimney moulds or flue divisions.
Facings.
Brick copings and extra labours on facings.
Drains and cesspools.

The foregoing order for a large work; if a small one, take the whole of the additions of brickwork first, then the omissions.

*Mason.*

The external masonry, beginning at bottom of building.
The deductions.
The internal masonry, beginning at bottom of building.
The deductions.

*Tiler, Slater, and Slate-Mason.*

Tiling or slating.
Cuttings.
Deductions.
Hips.
Ridges.
Slate-mason's work, internal and external.

*Carpenter.*

Timbering and carpentry of floors, commencing with lowest floor.
Ditto partitions.
Lintels and wood bricks, floor by floor.
Timber in roofs.

ralleys, and rolls.

r boarding and their

rds or fillets.
ets.
rds, cesspools, &c.
ts.
hich are not included in
the above sections, as
g, centering, &c.

### *d Ironmonger.*

with the lowest story
ceed in the following

ughout the building.
and their grounds and

complete, except glass
ting.

lete.

ironmongery with the
o which it belongs.

ofs and external work.
lumbing, cisterns, baths,
ratus, &c.

al, then external
g.

For the former measure floor by floor in the following order. The deductions of each floor to follow the additions of each kind of plastering.
Ceilings.
Walls.
Cornices.
Partitions.
Centre flowers.
Work in Parian, Keene's, or other cement throughout the building, beginning with lowest story.
For the external work begin at bottom of building and work upwards.

### *Founder and Smith.*

Take the ironwork with the trade in which it occurs, or as follows:
Cast-iron work.
Wrought-iron work, not taken with carpentry.
Beginning with lowest floor and working upwards.

### *Gasfitter.*

Pipes.
Fittings.

### *Bellhanger.*

Bells.
Pulls.

### *Glazier.*

Measure each kind of glass throughout the building, beginning with lowest story and working upwards.

*Paperhanger.*

The dimensions may be obtained from dimensions of plastering, and will consequently follow their order.

*Painter.*

Refer to the dimensions or the
See remarks "Modes of Mea
ment, Painter."

Reid's 'Young Surveyor's Preceptor' is an instruc
illustration of the foregoing system.

# CHAPTER XI.

## NORTHERN PRACTICE.

THE 'General Statement of the Methods Recommended by the Society to be used in Taking Quantities and Measuring-up Work,' published by the Manchester Society of Architects, appears to have been prepared with a view to facilitating the Northern system of obtaining separate tenders for each trade.

It is maintained in some parts of the country that the small number of men who are able to take the entire responsibility of a large work has rendered such arrangements necessary, but whenever practicable it is beyond question the better plan to obtain tenders for the entire work.

The paper above referred to is as follows:—

### GENERAL STATEMENT OF THE METHODS RECOMMENDED BY THE SOCIETY TO BE USED IN TAKING QUANTITIES AND MEASURING-UP WORKS.

*October*, 1866. *Revised January*, 1873.

*Further Revision, July*, 1886.

In taking quantities it will always be desirable to bear the character of the works in mind, and so to measure and describe them as to give parties estimating the clearest idea, and at the same time in the most concise manner, of their cost and character.

In measuring-up work already executed, it is of course only necessary to ascertain on what principle of measurement the prices have been determined, and then proceed accordingly.

## GENERALLY.

Fees to Corporation, hoarding, propping sides of found tions or walls, and use of water for the different trades, be mentioned in the trade that has to provide them, or und the head of charges to be borne by the general contract (If the right of advertising on hoarding is to be reserved the proprietor, it should be so stated.)

Each trade to provide its own scaffolding, unless speciall mentioned.

Each trade to provide its own mortar.

Protecting masonry with slabs, &c., to be put by prefe ence in carpenter's work.

Expense of watchman, making good damaged work, & to be inserted as occasion may arise.

Each trade to provide for the expense of the attendance the other tradesmen, and for cutting holes and makin good, &c.

When the general contractor is expected to be responsibl for damage by fire, an item for insurance to be put in th quantities—by preference in the carpenter's work.

Any provision of sums of money or values for articles shall denote the net cash to be paid by the builder, exclusiv of his profit and the cost of materials and labour required for fixing, which, however, should be fully stated.

Clerk of works' office and custody of drawings to be provided for.

## EXCAVATOR.

1. Stripping surface soil . . . . deep, and wheeling in heaps . . . . yards run, to be measured in superficial yards.

2. Excavating to be given in cubic yards, measured to 3 inches beyond the outer edge of footings; with extra beyond for batter of sides of excavation, depending on depth and nature of soil. State whether material is to be left on the ground or carted away; and if wheeled, state the distance. Extra price for wheeling every 20 yards run additional. The excavating for each successive depth to be

kept separate and the nature of the material to be excavated to be mentioned if possible.

3. Excavating to trenches for walls, &c., to be measured in cubic yards, and to be kept separate from the above, as also for underpinning or any special work that has to be executed separately.

4. Filling in and ramming to foundations, to be given as an item, or, if thought desirable, to be done by day work.

5. Clearing away rubbish from time to time, to be given as an item.

6. Filling in or forming foundation for paving and flagging to be taken in superficial yards, and state depth and material; or add this to the item of paving or flagging in mason's work.

7. Drains to be given in lineal yards with description thereof, to include cutting trenches and laying; describe method of jointing and filling in; and state average depth of each kind, and when practicable, mention whether in rock or other kind of ground.

8. Junctions, bends, &c., to be counted extra beyond the length of drain.

9. Cutting trenches and filling in to gas and water pipes (see Plumber), to be given in lineal yards.

10. Wells, cesspools, eyes, &c., to be given with proper particulars, as the work may require.

11. Keeping foundations clear of water beyond ordinary rainfall, and for propping to streets or adjoining buildings, to be given as items.

### BRICKSETTER.

1. Give description of materials, and mortar, and quality of work. The work, unless otherwise mentioned, to be reduced to one brick thick, and called "brick-length walling," in yards super. If sand, gravel, or water on the spot is not intended to be used, state so. If there be much work of half a brick only it is desirable to mention it. Where a building is lofty it is desirable to divide the work into stages vertically.

2. To obviate any misunderstanding as to so-called trade usages, with regard to other materials, as stone, &c., built in, it is proposed to measure the net quantity of brickwork to be executed; deducting entirely all labour and materials in openings having more than 100 square feet "*face*" measure, and deducting materials only (leaving "hollows" for labour) on the following:—

  *a.* All other openings than the above, the shape they are actually executed, provided they are openings in the walls and built above with the same materials.

  *b.* All sills, strings, cornices, &c., and other masonry or dressings built in, and being 6 or more inches high. The "hollows" thereon being assumed to pay for the labour in providing proper bed therefor, filling up thereto, and pointing up.

  *c.* Fireplace openings from underside hearth, and all flues, to be deducted as "hollows," and the lineal dimensions of flues (with size, if various) to be given for extra labour forming, pointing, and coring out.

3. Joists and beam ends, wall plates, door frames, band and gudgeon stones, codge stones, beam stones of ordinary dimensions, not to be deducted if built in with the work.

4. All walls finished with a bevelled upper edge, as to gables, &c., to be measured to 3 inches above the average height; and the lineal dimensions of "beam filling" between spar feet and of "gable cutting" given.

5. Any work intended to be whitewashed, to be measured "superficial," over all openings for pointing.

6. All splay cutting (with width), bevelled arrises, moulded arrises, bands of fancy work (with description), cutting to any shape not square, for ramps, hood moulds, &c., &c., double or other shaped reveals to be given lineal.

7. Stops to chamfers, and other single points requiring special labour, to be counted.

8. All brickwork in projecting bands, cornices, &c., to be measured as walling, the labour as above in No. 6.

9. Facing to be measured super. for "extra price over common;" and the net quantity executed only to be given,

after deducting all strings, sills, &c., &c. All openings less than 100 feet to be deducted and kept separate as "hollows for extra labour over common work," to pay for the labour, plumbing and setting out. Reveals to be measured for facing separately.

10. Cavity walling to be measured the actual thickness of the bricks, as for instance, to be measured at 1½ brick or 2 bricks, &c., as the case may be; and the superficial dimensions of the wall measured across all openings under 100 square feet, as "extra labour and extra materials for bond, forming cavity walls." The nature of the ties to be mentioned.

11. Work in cement, or other material than the general run, to be taken for "extra price over mortar," and the description of the material given.

12. Backing up to ashlar walling to be kept separate from the ordinary walling.

13. Wrought-iron bond, if used, to be given in lineal feet.

14. Common relieving arches to be counted with average span, and separated into various thicknesses of wall, and number of rims in depth, and this to cover all extra labour and materials.

15. Arches in facing to be either counted, with spans, depth, and soffit given, and this to include all extra labour and materials, including skewbacks, and cutting superimposed work to fit the rake; or else measured super. as executed, for "extra labour and materials over facing;" girthing the face and soffit net, and measuring separately the skewbacks, and cutting super-imposed work to fit the rake, when the shape of the arches requires it.

16. Ordinary arching to fire-proof floors, &c., to be measured stuff and work in square yards, with description and thickness, girthing along the line of average thickness, and measure the lineal feet of skewbacks with description. Groins to be measured lineal. Allow for cutting and fitting to ironwork.

17. Trimmer arches to be counted, with average size, for

"stuff and work," including backing-up, and state whether solid or concrete backing is intended.

18. Backing to arches that have been measured, as in No. 16, to be taken super. with average thickness and description of material.

19. Damp proof courses to be given lineal with widths.

20. Risers for slopstones, steps, flag shelves, &c., to be counted for "stuff and work," or if measured as walling, to be kept separate, and so stated.

21. Wine bin divisions measured super. with thickness, and kept separate, or with the above.

22. Eyes, air-grids, chimney pots, setting grates, or other special items, to be counted, with description, and the mode of executing the work.

23. Covering walls to protect them on special occasions, and manner of doing it, to be added to the Bricksetter's contract.

24. Items: To cleaning down, making good, pointing, &c., at finish.

25. It would be well to call the contractor's attention to the fact that his price must include making good any damage done by frost.

26. Concrete in foundations to be measured by the cube yard.

## MASON.

1. Plain ashlar walling and parpoint walling to be measured super. net work, for "stuff and work," giving the kind of face, and average sizes, and bed of the stones; allowance to be made where square blocks have to be cut and to suit shaped openings, ramps, &c., and defining the number and dimensions of the through stones. Reveals to be measured extra. Rubble walling up to 18 inches in thickness to be measured superficial and described; above that thickness to be measured in the cube and described.

2. Other masonry to be measured as hereafter mentioned, keeping the stone and labour separate, or when conducing to the better understanding of the work, as in strings, &c., to

be measured in lineal feet, "materials and labour," with sufficient particulars to enable the number of joints to be included; count the fair ends, quoins, &c.

3. Work in chimneys, or cornices, &c., requiring special appliances for hoisting, or at considerable heights, or of extra dimensions, to be kept separate, so far as the material, hoisting, and setting are concerned; the labour, when done on the ground, may be thrown in with the rest.

4. Under the head "stone" must be included the labour in hoisting and setting, and state approximately the quantity to be set above 40 feet from the ground.

5. Special appliances for hoisting, such as travelling cranes, &c., to be specially mentioned.

6. In measuring the cubic feet of stone for other than the work previously mentioned, 1 inch each way beyond the net dimensions of each block, when worked, to be added.

7. In measuring the labour, the necessary operations of the workman to be followed. The beds and joints of each block to be measured, and kept under that head; and it will conduce to more easy pricing of the work when these can be given in lineal feet, with the average width, particularly for strings, cornices, architraves, jambs, &c.

8. The work exposed to sight to be classified under its different heads, mentioning whether bosted, tooled, or polished, and giving plain work, sunk, moulded, sunk and moulded (this when the straightedge will not work the block from a mould applied at each end), weathered, sunk and weathered, and the various kinds of fancy surfaces, and clearly distinguishing from straight work that which is raking, circular, circular on circular, &c.

9. Raised or sunk panels will require that face of the block to be first measured for plain work (for setting out on), then the face work, and the lineal feet of margin of its particular kind.

10. The points from which to girth moulded work will be best ascertained by a consideration of the manual process followed in its execution; in some strings it will thus have to be girthed from wall above to wall below; in other

instances, as cornices, where the top is measured for sunk and weathered work, the moulded work will girth from the nose only.

11. All mitres to be counted, with the girth of the mould, &c., they belong to, and state whether internal or external.

12. Throats to be clearly given, either separately in lineal feet, where the soffit has been measured as a "bed," or, in other instances, girthed in with the moulded work.

13. The back of masonry will not generally require any notice, except where it shows through a wall that is not plastered, and in some quoins that bed more than the thickness of the walls, where the sinking must be taken into account. Tooling or rubbing backs of architraves, mullions, &c., to bed frames against, to be measured lineal, and all checking out for the same purposes to be measured in the same way.

14. Holes for flues, timbers, &c., to be counted.

15. Rough sinking down as a preparation for the Carver to be given superficially, girthing round the cap, truss, &c., &c.

16. All carving to be clearly set forth with reference to the drawings or special marginal sketches; running ornaments to be given lineal with the girth; but caps, bosses, trusses, modillions, pateræ, &c., numbered. State if Carver is to find his own scaffolding.

17. Ordinary window sills to be numbered, with dimensions.

18. Others than these to be taken cube, and the labour taken out as before, and in addition the seats counted for jambs, mullions, &c.

19. As tracery will generally be of a description between the work of an ordinary mason and that of a carver, the most satisfactory way would appear to be to measure one face over all the work as plain work for setting out on, and then number each piece of tracery with its dimensions and reference to the drawings or special marginal sketch for the remainder of the labour, but measuring separately any groove or rebate for glazing.

20. Mullions and other work with little material, as com-

pared with the labour, to be measured lineal, "stuff and work," with particulars or sketch, and give general indication of the lengths.

21. Columns to be girthed for circular work (with or without entasis, as the case may be), and flutes measured lineal with sketch, and number of stops counted; if in extra lengths, keep both materials and labour under a separate head.

22. Rustics and other channelled work to be measured lineal (after the surface and beds have been fully measured) with sketch.

23. Cramps and dowels to be counted, with average size or weight, if metal, and letting in and running; and state whether mason is to find lead.

24. Copings, where worked out of flags or thin material, to be measured lineal, and nett as fixed, with proper description of each face and mode of jointing. All knees, apex, and foot stones to be counted with sketch or particulars of labour thereon. Any perforations for flues, &c., to be counted.

25. Flagging to be measured nett, in square yards, with proper description of materials, average and minimum size of flags, method of jointing and laying; and whether mason to provide bed and mortar, and if so, describe same. All exposed nosings to be measured lineal; and any perforations or notchings out to fit special corners or other objects, to be counted or measured, and the portion so notched out of any flag included in the gross measurement.

26. Flags, if required to be above 12 feet super. to be kept under the head of "landings."

27. Any special mode of jointing flags or landings, as lap or joggle joint, to be measured once along the joint.

28. Hearths to be given in superficial feet, and if the fore and back hearth be in one piece, state "large sizes," and count the notchings for jambs.

29. Paving to be measured nett, with description of sets and method of laying, and whether mason finds the bed or not.

30. Keep each kind of tiling to floors separate, and state whether and what kind of bed is to be provided.

31. Band and gudgeon stones, codge stones, beam and pillar stones to be counted, with dimensions and particulars of work thereon, and whether Mason has to let in and run any iron work therein, or to find lead therefor.

32. Steps, where practicable are best counted, with dimensions and particulars; solid steps may be taken lineal, with average length, and count the number for pinning in, and also the worked ends. All letting in of balusters, newels, &c., to be clearly given, and joggle or notched joints measured.

33. Landings, half spaces, &c., to be either counted with description or taken super. with all joints, worked edges, and soffits measured.

34. Letting in of grids to drains, coal places, areas, &c., to be counted, and state whether lead to be found, and if the stone or curb has to be rebated, state so.

35. Area and other curbs to be taken lineal, and if cramped, so stated, with average lengths of the stone.

36. Dubbing out with flags, for cornices, &c., for the plasterer, to be taken lineal, with width and thickness, and any special labour.

37. Slopstones, &c., to be either counted with particulars or measured super. with the labour; the sinking to be girthed bottom and sides each way; mention the hole for grid, and whether to be fixed by the mason.

38. Mason's work generally requires very minute subdivision in measuring, and a knowledge of the method of working stone is essential to the proper performance of that duty. Each necessary operation of the workman should be taken into account, although it may appear that the same surface (as in panelled or enriched work, &c.) has to be measured more than once for different descriptions of work.

39. Clean down and leave all perfect at completion, as an item.

## CARPENTER AND JOINER.

1. Unless a special provision be made that timber and joiner's work must finish nett to the dimensions given (the

waste being calculated then in the price), it must be understood that all work will follow the original marking or "pricking" for sawing, thus each sawn face would reduce the scantling by nearly $\frac{1}{16}$-inch or half the width of sawcut, and each wrought face would entail a further reduction of about $\frac{1}{16}$-inch. A 12 × 6 inch scantling would thus measure $11\frac{7}{8} \times 5\frac{7}{8}$-inches full, and a 2-inch door would finish $1\frac{3}{4}$-inch full.

2. Labour framing and nails to be measured super. in square yards, for floors, roofs, and ceiling joists; keeping the different descriptions, whether for single-joisted or framed, separate, and defining the mode of framing, and taking the dimensions over the extremities of the timbers, or the timber may be taken cube and to include the labour.

3. Labour framing principals to be measured the length of span, with wallhold, and separating the different kinds; the same with framing trussed partitions.

4. Ordinary studded partitions, and filling in to the above, to be taken super. in yards, for "stuff and work," with scantlings and distances apart.

5. Labour framing hips and valleys, in lineal feet.

6. Gutters lineal, or if wide, super. and state if with bearers; count cesspools, with dimensions.

7. The timber to be taken cube when sawn to scantling, keeping, as far as practicable, large scantlings, as beams, purlins, large joists, &c., separate from small, as spars, plates, &c. Beams are best given in lineal dimensions, and when over 35 feet long, should be kept separate.

8. When conducing to the better understanding of the work, however, large timbers, or those with special labour, to be measured lineal, and properly described.

9. Deals, planks, and battens used for joists, &c., to be taken superficial or cube.

10. Planing or other special labour to timbers, measured super. or lineal in feet, and stops to beads or chamfers counted.

11. All timbers to be measured nett lengths as fixed, and trimmings for hearths, wells, skylights, &c., counted.

12. Angle beads, staff beads, and tilting fillets, in lineal feet.

13. Bolts, dogs, straps, &c., of iron, to be counted, keeping joint bolts separate from others.

14. Nogs and templates to be counted, or kept separate under a cube or lineal dimension.

15. Snowboards, in lineal feet, with width and description.

16. Ridge and other rolls, and hip and valley boarding, in lineal feet, with width.

17. Centering, in square yards, except centres for doors and window openings, &c., which are to be counted, with span and width. In extensive fireproof works, a small quantity of centering will often suffice if "taking down and refixing" be given, together with the necessary staying.

18. Cornices and face boards in lineal feet, with description and particulars of bearers, &c., and count mitres to the former.

19. Ordinary flooring in square yards nett; mitred margins to be counted.

20. Pugging to floors, measure across the timbers and state description, whether on slabs and fillets, or laths, and if filled in, describe.

21. Skirtings in lineal feet as fixed, with dimensions and description, and state whether to include grounds; where above 7-inch, count all mitres and ramps, and labour housing to architraves, chimneypieces, &c.; if tongued to floor boards, state so.

22. Door casings and frames in lineal feet (allowing length for tenons, &c.), and state whether framed, and number of rebates; count frames for dowelling.

23. Doors, gates, &c., nett size in super. feet, allowing for rebate in folding doors, keeping each description separate, and state if flush-beaded at meeting edges, or for double margins, &c.; hanging to be counted and described, locks and other fittings at a price each and labour fixing; bolts to dimensions, and ditto.

24. Architraves in lineal feet nett measure, and state if with grounds, and, except for single moulds up to 3-inch, count all mitres, or special adaptations; blocks to be counted in pairs, including all labour fitting architraves thereto.

25. Window sashes and frames to be measured full size of frames; if not square headed, state so, or else count the heads for extra price, with description; state if extra strength be required in any part of frame, or any particular way of working weatherings, sinkings, &c.

26. Casement sheets and frames to be measured separately and as above, with scantlings.

27. State if holdfasts or other particular mode of fixing frames be required.

28. Skylights to be measured full size. Any portion of a sheet made to open, to be measured again in addition, if it is a separate piece of framing, and any grooving, weather fillets, &c., accounted for.

29. Window backs and elbows, and soffits, and linings, worked one side only, to be kept separate from shutters, and state if to have grounds; if linings are under 9 inches wide, take lineal, with the width. Plinths and capping and flush beads to be measured lineal. Hanging sheets and casements to be counted, with particulars of pulleys, cords, weights, hinges, fastenings, &c. Hanging shutters and backlaps ditto. Window bottoms lineal, and count returned ends.

30. Bracketing for cornices in lineal feet, with girth or sketch of brackets, and distances apart.

31. Coves, super. feet, for stuff and work.

32. Cradling round beams, super. for stuff and work.

33. Bridging for floors in lineal feet, and state whether slab or herring-bone bridging, also whether tie rod or hoop iron is to be used.

34. Wall boarding and dados in super. feet, and give lineal feet of grounds, and also fitting to architraves, &c.

35. All casings to underside beams, gutters, cisterns, &c., in super. feet, with description, or else lineal, with girth and number of beads.

36. Pipe casing, ditto, and state if to be fitted with screws for taking down at pleasure.

37. The different items of water-closets to be kept separate, and state if fitted with screws, &c., to take down; seat and bearers, fall and frame, riser, all super.; skirting, super. or lineal according to requirements; capping separate. Holes cutting, falls hanging, hinges, paper boxes, &c., and attendance on plumber, to be counted.

38. For bath framing take riser and skirting as for water-closets; bearers for curb lineal; curb lineal, with average width, or super.

39. French polishing to be where practicable measured separately in superficial feet.

40. Fixtures require careful measurement in detail; skeleton fronts for drawers and small cupboard fronts separate from the fronts themselves; bearers, false bottoms, drawers fitting with stops hanging doors, knobs, and other fastenings, divisions, guides, &c., all to be taken into account; shelves with widths and bearers or brackets, also hook rails all lineal.

41. Stairs in ordinary cases to be counted, with dimensions, and state whether returned nosings and cut string boards, notch boards, and number of carriages; measure hand rail, and balusters, and newels separate; and casing and nosing, hand rails and balusters along landings; count ramps, scrolls, curtail ends, and circular corners to wells; give spandrel framing separate from square framed work; state French polishing; landings to be taken super. in feet including bearers, and nosings, &c., at the edge, to be taken lineal.

42. All other items of ironmongery to be counted, with particulars, or price and labour fixing in addition.

43. All circular work throughout to be kept separate from straight work.

44. Enter up reserved amounts, provisions of materials or cash, &c., and clearly state if such are to include contractor's profit or to be deducted in full.

45. The carpenter generally undertakes the fixing of the

ironwork, and in many instances it might be desirable to put the fixing and staying during erection in his quantities, giving the weight of cast- and wrought-iron beams, &c., and counting the bolts, rods, &c.

46. Insurance if to be provided for by the carpenter to be entered.

### PLASTERER AND PAINTER.

1. State description of materials, and keep the work of each kind separate.

2. Plastering on walls to be measured from the floor upwards, or from the point where each description of work commences.

3. Where cornices are lathed on brackets, measure ceiling and walls to the edge of the brackets only.

4. Where cornices are not bracketed, measure the ceiling full size of room, and the walls up to ceiling; all in super. yards.

5. Deduct all openings 100 square feet and over; deduct materials and add labour (hollows) for net sizes of doors, windows, fire-places, and other openings under 100 feet super.

6. Where ceilings are panelled and coffered, or coved, girth round all portions that are lathed, keeping circular work separate.

7. Ceilings plastered between spars, &c., to be measured across the spars and purlins, and even then kept separate, and described as such.

8. All work run with a mould to be measured lineal on the wall and the girth given, as cornices, rustics, strings, architraves, soffits, quirks, &c.; count all mitres, with the girth of mould they belong to; count mitres in panelled work.

9. All cornices, &c., lathed on brackets to be kept separate, and described as such.

10. All cast work to be counted, except running enrichments.

11. Enriched members to be measured lineal, with girth.

12. Modelling of enrichments to be, if special, so stated, and the models to be the property of the architect.

13. Ceilings or walls covered with panels, formed by small moulds, to be measured super. with illustration or drawing, for "extra price over plain work;" larger panelling or special decorative features to be measured in detail.

14. Angles to pilasters, &c., if specially formed in cement or otherwise, to be so measured, lineal and extra to plastering.

15. Door and window frames, bedding and pointing, to be counted, and state material to be used; also flushing to inside of frames after fixing, or behind casings, window backs, or other work to be given.

16. Making good generally, and after plumber, gasfitter, bellhanger, &c., and chimneypieces, as an item, stating numbers.

17. Colouring and whitewashing walls, &c., to be in super. yards, measuring over all openings under 100 super. feet; if the work has to be pointed by the plasterer, state so.

18. Painting to include stopping and knotting, and to be given in square yards. Priming to be separate, if on work painted before being fixed. Painting to be girthed round all exposed surfaces, except as below.

19. Balusters, if ordinary square, and grids, gates, and other metal work painted on both sides, with bars about 5 inches to 6 inches apart, to be measured one surface only; if closer or slightly ornamental, 1¼ surfaces; and for very close or very ornamental work, 2 to 2½ surfaces.

20. Windows to be measured each surface over full size of opening for painting frame and sheets, or else the frames counted, and the sheets, if large squares, counted; but if in small squares (as old-fashioned crown-glazing), then count the squares instead of the sheets.

21. Fancy or ornamental painting to be measured in detail, with lengths of mouldings picked out, gilt, &c. All work in parti-colours to be kept separate from plain work.

### PLUMBER AND GLAZIER.

1. The lead to be reduced to weight, and the different kinds of work kept separate, as gutters, flashings, valleys and ridges, and flats; the work requiring solder, as cisterns and cesspools, dressing over finials, and other fancy work; allow proper lap, as specified, to flashings, drips, and rolls; the nett quantity of lead, as fixed, only to be measured.

2. All water, supply, service, waste, or other pipes to be given in lineal feet, with the weight per foot or thickness; the dimensions stated to mean *in all cases, whether specified or not, the clear internal bore.* The price to include all soldering and forming joints, wall-hooks and fixing.

3. No allowance to be measured for sockets and joints in iron piping, down-spouts, &c.; but state whether flanges or holdfasts are to be included.

4. If pipes are to be laid in trenches in the ground, state so, and how, and whether plumber is to do the excavator's work.

5. Count all traps, and also all bends and shoes to down-spouts or soil pipes, spitters from cesspools to spouts, rain-water heads, taps, plugs, overflows, wastes with plug and washer, water-closet and bath-fitting (the pipes thereto and therefrom measured with the other piping), wash-basins, urinals, hot-water cisterns, and other special fittings, and in all such instances to give a clear, unmistakable description of what is required, or the price, exclusive of fixing.

6. Iron gutters and down-pipes to be measured in lineal yards; no allowance for joints, but elbows, stopped ends, &c., to be counted and described.

7. The different descriptions of glass, with thickness or weight per foot, to be given in superficial feet, assorting each into different average sizes, and keep bent sheets separate. Curved or other special edges, to be measured lineal, the glass being first measured the size such special shape has to be cut from, Special descriptions of work, such as lead lights, &c., to be described.

8. Pointing to flashings to be measured lineal and described.

9. Making good and leaving all perfect at conclusion of works, as an item.

### IRONFOUNDER.

1. The most suitable method is to reduce each description of work to weight, keeping columns separate from beams, small castings from large, and intricate ones, as railing, grids, &c., separate from plain ones; the cost to include pattern making; any fancy work to be specially mentioned, and the castings from each such pattern kept separate from others; the metal to be taken at 40 lbs. per foot super. 1 inch thick.

2. State whether price to include fixing. (*Vide* No. 45 in Carpenter.)

3. Special labour, as turning columns, coupling boxes, &c., to be given in detail.

4. State whether beams are to be tested, and if at contractor's expense and risk.

5. Bolts and other small fittings to be counted and described, with the labour necessary in preparing for and fixing them.

6. State whether lead or other material is to be found for running lugs, &c., and indicate the number of them.

7. Long bolts, tie-rods, &c., to be measured lineal, with allowance for head and nut, and count the number of nuts, and screwing, and washers.

8. Swing sheets, gates, &c., and their fittings, hangings, and fastenings to be fully described and counted, both for materials and labour.

9. In measuring wrought-iron beams and frame-work, ascertain the weight of metal in plates and other shapes, adding the rivets and bolts, with the labour separate on any particular forgings or cuttings.

10. All wrought-iron, rolled or built girders to be fully described and given in lineal lengths, with section.

11. If painted before fixing, to be measured in full.

### SLATER AND TILER.

1. State size and description of slates or tiles, nails, and battens, and whether and how pointed underneath, and amount of lap.

2. The usage varying with respect to allowances at eaves for double course, and hips and valleys for waste, the Manchester Society of Architects purposes to measure slating nett as finished, and to give the length of eaves for extra price of double course, and the length of each bevelled edge at hips and valleys, &c., for "single bevel cutting and waste," and also the bevel cutting where so done to land-gutters, &c. All openings of 100 feet to be deducted entirely, and any others, but allowing for labour as "hollows," below that amount down to 6 feet super. below which no deductions to be made. Any special cutting, as close hips, &c., to be separately mentioned and described.

3. In tile roofs, hips and valleys to be measured lineal, and fitting included.

4. Ridge tiling to be fully described and given in lineal yards, and state how to be bedded and pointed.

5. Pointing to overhanging eaves or gables, in lineal feet.

6. Sweeping and cleaning out gutters, leaving all clean and perfect.

7. Circular slating, fancy courses, slating to spires, or other special work to be kept separate, and fully described.

### SUNDRIES.

Floor or wall tiling, paper hanging, cooking and heating apparatus, bellhanging and gasfitting, are generally matters of separate arrangement with the tradesmen. If requisite to include the two latter, bellhanging may be given at so many bells with 1 pull, and so many with 2, the furniture being described and counted; gasfitting at so much per position, exclusive of meter, for piping, and brass bits, or else measured in detail, as for water piping.

In the foregoing paper there are a few items worthy of remark.

*Generally.*—These clauses are framed to meet the arrangement of separate tenders for each trade.

*Excavator, Clause* 2.—Excavation measured 3 inches beyond outer edge of footings, instead of 6 inches, as in London practice.

*Bricksetter, Clause* 1.—The reduction of the brickwork to superficial yards of 9 inches thick.

*Clause* 2.—The deductions of openings. (The clear external aperture only.) The way the work is usually treated being to make an item in feet superficial of "labour to openings," but this only applies to apertures not exceeding 100 feet superficial each.

Allowance of "labour to openings" to sills, strings, cornices, &c.

Measuring lineal dimensions of flues for extra labour forming and pointing.

*Clause* 4.—The allowance of 3 inches for gable cutting is not recognised in London practice, but is measured as raking cutting to facing, which deals with 4½ inches inwards from face of wall. The remainder of thickness of wall being measured as rough cutting.

*Clause* 5.—Measuring over openings for pointing. Only the nett quantity measured. London practice.

*Clause* 9.—"Hollows for extra labour over common work" unknown in London practice.

*Clause* 10.—Cavity walling measured in London, including the cavity, and no allowance made for "extra labour and extra materials for bond forming cavity walls."

*Clause* 17.—Numbering trimmer arches—measured by the foot superficial in London practice.

*Mason, Clause* 5.—Unusual in London practice, the various heights of hoisting being stated, the means are left to contractor's choice.

*Clause* 6.—Allowance of 1 inch each way, unknown in London practice.

*Carpenter, Clauses* 1, 2 and 3.—Labour and nails never measured for bills of quantities in London practice.

*Clauses* 4 and 5.—Unknown in London practice.

*Clause* 7.—These distinctions only observed in London practice when timbers are unusually small or unusually large.

*Clause* 11.—Trimmings never counted in London practice.

*Clause* 16.—Hip and valley boarding measured superficial in London.

*Clause* 19.—Mitred margin usually included in description of floor, and the latter measured in feet, in London practice.

*Clause* 23.—"Hanging to be counted;" the hanging is included with the door in London practice though not mentioned.

*Clause* 24.—Grounds are always separated in London practice.

*Clause* 41.—"Stairs (steps?) in ordinary cases to be counted;" always measured per foot superficial in London practice.

*Plasterer and Painter, Clauses* 5, 17.—All openings deducted and no item of "labour to openings" taken in London practice.

*Clause* 19.—Only the actual surface painted if measured in London practice.

*Clause* 20.—All counted in London practice.

*Plumber and Glazier, Clause* 1.—Not so many distinctions observed in the labours on sheet lead in London practice.

*Clause* 2.—Branch joints always taken in London practice.

*Slater, Clause* 2.—The allowance for cutting to eaves is well defined, and labour to hollows is unknown in London practice.

A few instances of items as they would appear in a bill to accord with the foregoing system are as follows:—

| Yards. | ft. | | | £ | s. | d. |
|---|---|---|---|---|---|---|
| 11,200 | 0 | supl. | Brickwork in mortar reduced to one brick length .. .. .. .. .. | | | |
| | 278 | " | Labour only to openings or "hollows" reduced to one brick length .. .. | | | |
| 149 | 0 | " | Extra for forming ¾" cavity in thickness of wall and filling with White's Hygeian Rock Composition .. .. | | | |
| | No. | 2 | One story flues parget and core .. | | | |

| | | | | £ | s. | d. |
|---|---|---|---|---|---|---|
| | No. | 2 | Two story ditto .. .. .. .. .. .. | | | |
| | „ | 25 | Making good tiling around ventilating trunks, 12″ × 12″ .. .. .. | | | |
| | „ | 2 | Ditto skylights, 4′ 0″ × 6′ 0″ .. .. | | | |
| | 1800 | cube. | Fir converted .. .. .. .. .. .. | | | |
| | | | Sometimes labour and nails do not appear, and in such case a heading is made thus, and the number billed in order of scantlings with description. | | | |
| | | | *Work in Roofs.* | | | |
| | 100 | run | 4½″ × 3″ plates .. .. .. .. .. .. | | | |
| | 100 | „ | 7″ × 2½″ floor joists .. .. .. .. .. | | | |
| | 100 | „ | 5½″ × 3″ ditto, &c. .. .. .. .. .. | | | |
| Squares<br>2 | | supl. | Labour and nails to plates and ground joists .. .. .. .. .. .. .. .. | | | |
| 31 | | „ | Ditto to naked flooring with joists notched and framed to beams .. | | | |
| 33 | | „ | Ditto, with joists, plates, and beams part fitted and fixed to iron .. .. | | | |
| 19 | 50 | „ | Labour and all materials in 3″ framed and braced partition, with 4½″ × 3″ heads and sills, 3″ × 2½″ quarters and braces, and 3″ × 2″ interties ..<br>No 5, extra to forming doorways. | | | |
| 36 | | „ | Labour and all materials in 3″ × 2½″ ceiling joists, 15″ from centre to centre, and framed to roof timbers | | | |
| 80 | | „ | Labour and all materials to 3″ × 2½″ rafters, 15″ from centre to centre, and labour and nails only to roofs, with purlins, plates, ridge, and collars .. .. .. .. . .. .. | | | |
| | No. | 3 | Labour and nails in framing, hoisting, and fixing truss 24′ 0″ × 8′ 0″ and the ridge 30 ft. from ground .. .. | | | |
| | „ | 2 | Extra for trimming joists for trapdoor .. .. .. .. .. .. .. .. | | | |
| | „ | 5 | Ditto, roof for chimney-stack .. .. | | | |
| | „ | 2 | Ditto, large skylight .. .. .. .. .. | | | |
| | „ | 2 | Ditto, joists for stairs 11′ 0″ × 3′ 0″ on plan .. .. .. .. .. .. .. | | | |
| Yards<br>190 | 0 | supl. | Render float and skim .. .. .. .. | | | |
| 180 | 0 | „ | Lath plaster, float and skim .. .. | | | |

# CHAPTER XII.

## EXAMPLES OF COLLECTIONS.

A COLLECTION of excavation, brickwork, &c., see "Examples of Taking off."

In the case of a collection for a provision, show its detail thus:—

### STOVES AND CHIMNEYPIECES, EXCLUSIVE OF SETTING.

*For setting and fixing see Col.* 10.

| | Stove. | Chy.-piece. |
|---|---|---|
| Dining-room .. .. .. | £10 | £15 |
| Drawing-room.. .. .. | 10 | 20 |
| Library, &c. .. .. .. | 4 | 4 |
| | £24 | £39 |

Provide for three stoves and three chimneypieces, exclusive of fixing, 63*l.*

*Collect timbers in the following manner*:—

You will possibly have several sizes of joists on one floor, 9″ × 3″, 7″ × 2½″, &c. Commence with the 7″ × 2½″ thus:—

| | | | | | Trimmer | | Ex. for T. | | H.B.S. | | R.Y.C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ft. | in. | ft. | in. | ft. | n. | ft. | in. | ft. | in. | |
| Bedroom 3.— | 6/10 | 0 = | 60 | 0 | | | | | | | |
| | 3/ 8 | 0 = | 24 | 0 | | | | | | | |
| | 2/ 2 | 0 = | 4 | 0 | 4 | 9 | 20 | 0 | 10 | 0 | 0 |
| Bedroom 4.— | 6/11 | 0 = | 66 | 0 | | | | | | | |
| | 3/ 9 | 0 = | 27 | 0 | | | | | | | |
| | 2/ 2 | 0 = | 4 | 0 | 4 | 9 | 22 | 0 | 10 | 0 | 2 |
| | | | 185 | 0 | 9 | 6 | 42 | 0 | 20 | 0 | 4 |

| | | | |
|---|---|---|---|
| 185 0<br>7<br>2½ | 22 6 | **Fir frd. in floors.** | **Joists.** |
| 9 6<br>7<br>3½ | 1 7 | **Add.** | **Trimmers.** |
| 42 0<br>7<br>1 | 2 1 | **Add.** | **Ex. for trimmers.** |
| 20 0 | 20 0 | **2 in. × 1 in. herring-bone strutting spiked to 7 in. joists.** | |
| 4/ | 4 0 | **Rough York corbels 9 in. × 9 in. × 3 in. and building in.** | |

Proceed to collect the other sizes in a similar manner.

Where there are a number of quarter partitions, a collection in some such form as follows is a considerable saving of labour, and each dimension may nevertheless be easily identified.

The letter placed against each dimension will be found an assistance, as H for head, S for sill, &c.

| | Head Sills, Posts. | | Interties and braces. | Quarters. |
|---|---|---|---|---|
| South of bath-room. | 4/11 0 = 44 | 0 P | 8 0 I | 2/11 0 = 22 0 |
| | 2/ 8 0 = 16 | 0 H & S | 9 0 B | 2/ 4 0 = 8 0 |
| North of bedroom 9. | 4/11 0 = 44 | 0 P | 9 0 I | 3/11 0 = 33 0 |
| | 2/ 9 0 = 18 | 0 H & S | 10 0 B | 4 0 |
| | 122 | 0 | 36 0 | 67 0 |

| | | |
|---|---|---|
| 122 0<br>4<br>4 | 13 7 | Fir framed in quarter partition. |
| 36 0<br>4<br>3 | 3 0 | |
| 67<br><br>2¼ | 4 4 | |

### *A Collection of Skirtings*

See the plan, Illustration No. 17.

In good work, make the distinction for skirting with grounds plugged or fixed with wall hooks.

SKIRTINGS.

| | Skirting. | | Mitres. | Irreg. M. | F.E. | H. |
|---|---|---|---|---|---|---|
| Drawing-room.— | 5 | 6 | | | | |
| | 5 | 6 | | | | |
| | 18 | 9 | | | | |
| | 15 | 1 | | | | |
| | 25 | 9 | 6 | 4 | 2 | 2 |
| Dining room.— | 16 | 8 | | | | |
| | 14 | 11 | | | | |
| 2/1 11 = | 3 | 10 | | | | |
| | 15 | 11 | | | | |
| | 14 | 11 | 8 | | 2 | 10 |
| | 136 | 10 | 14 | 4 | 4 | 12 |

| | | |
|---|---|---|
| 136 10 | 136 10 | Deal moulded skirting in three pieces, the lower part of 1¼" torus moulded 6" high tongued to floor; the middle part of 1", the moulding 4½" girth, all tongued together; 13" high in all, including groove in pitch-pine floor and the necessary grounds and backings, as sketch. |
| 14/ | 14 | Tongued and mitred angles. |
| 4/ | 4 | Irregular ditto. |
| 4/ | 4 | Fitted ends. |
| 12/ | 12 | Housings. |

In a large building, doors of uniform size and finish, but in walls of various thickness, may sometimes with advantage be collected as follows:—

LININGS.

| | 6" | 11" | 15" | R.F.S. | L.P.F.S. |
|---|---|---|---|---|---|
| Room 1. | 1 | 1 | | 2 | 2 |
| „ 2. | 1 | | | | 2 |
| „ 3. | 1 | | 1 | 2 | 2 |
| „ 4 | | 1 | 2 | 6 | |
| | 3 | 2 | 3 | 10 | 6 |

| | | | | |
|---|---|---|---|---|
| 8/ | 3 0<br>7 0 | 163 0 | 2′ four-panel mo. b.s. door. | |
| 8/ | 1/ | 8 | Pairs 3½″ W. I. butts. | |
| 8/ | 1/ | 8 | 6″ mortise lock and brass furniture. | |
| | | | | 7 0<br>7 0<br>3 0<br>5<br>17 5 |
| 3/ | 17 5<br>6 | 26 2 | 1¼″ double rebd. jamb linings tongd. at angles. | |
| 2/ | 17 5<br>11 | 31 11 | 1¼″ do., cross tongd. | |
| 3/ | 17 5<br>1 3 | 65 4 | | |
| | | | | 17 5<br>4/3″ = 1 0<br>18 5 |
| 8/ 2/ | 18 5 | 294 8 | 3″ × 1″ framed and splayd. grounds. | |
| | | | | 18 5<br>4/2″ = 8<br>19 1 |
| 8/ 2/ | 19 1 | 305 4 | 2″ × 1¼″ moulded architrave and mitres. | |
| 10/ | 3 6<br>7 3 | 253 9 | Ddt. R. F. and S. Walls,<br>and<br>Paper at 2*s*. | |
| 6/ | 3 6<br>7 3 | 152 3 | Ddt. L. P. F. and S, partns.,<br>and<br>Paper at 2*s*. | |

### *A Collection of Plastering and Papering of Walls.*

Select the rooms which are of the same height.

| | R. F. & S. | L. P. F. & S. | Angle. | Do. splay. |
|---|---|---|---|---|
| Bedroom 3.—2/14 | 0 = 28 0 | | | |
| 2/12 | 0 = 24 0 | | 2 | |
| Bedroom 4.—2/14 | 0 = 28 0 | 12 0 | | |
| | 12 0 | | 2 | 1 |
| | 92 0 | 12 0 | 4 | 1 |

| | | | |
|---|---|---|---|
| | 92 0<br>10 0 | 920 0 | R. F. & S. walls<br>and<br>Paper at 2*s*. per piece. |
| | 12 0<br>10 0 | 120 0 | L. P. F. & S. partns.<br>and<br>Paper at 2*s*. per piece. |
| 4/ | 10 0 | 40 0 | Keene's cement angle and two 2 in. returns. |
| | 10 0 | 10 0 | K. C. splay 3 in. wide and two 2 in. returns. |

Then proceed with those of differing heights in a similar manner.

Sometimes in attics a limited range of heights will frequently recur, and may be collected as follows:—

| | R. F. & S. | | | Arris. | L. P. F. & S. | | | Arris. |
|---|---|---|---|---|---|---|---|---|
| | 3′ 0″ | 4′ 0″ | 7′ 0″ | | 3′ 0″ | 4′ 0″ | 7′ 0″ | |
| Room 1.— | 4 0 | 4 0 | 5 0 | 7 0<br>7 0 | 4 0 | 5 0 | 6 0 | 6 0<br>6 0 |
| Room 2.— | 5 0 | 4 0 | 4 0 | 4 0<br>5 0 | 6 0 | 5 0 | 4 0 | 4 0 |
| | 9 0 | 8 0 | 9 0 | 23 0 | 10 0 | 10 0 | 10 0 | 16 0 |

| | | |
|---|---|---|
| 9 0 | | |
| 3 0 | 27 0 | R. F. & S. walls. |
| 8 0 | | |
| 4 0 | 32 0 | |
| 9 0 | | |
| 7 0 | 63 0 | |
| 10 0 | | |
| 3 0 | 30 0 | L. P. F. & S. partns. |
| 10 0 | | |
| 4 0 | 40 0 | |
| 10 0 | | |
| 7 0 | 70 0 | |

23 0
16 0
39 0

| | | |
|---|---|---|
| 39 0 | 39 0 | K. C. arris and two 2 in. returns. |

*A Collection of Cornices.*

| | Mitres. | Irreg. do. |
|---|---|---|
| Bedroom 3.—52 0 | 8 | |
| Bedroom 4.—52 0 | 8 | 1 |
| 104 0 | 16 | 1 |

| | | |
|---|---|---|
| 104 0 | 104 0 | P. Mo. Cornice or P. P. C., 6 in. girth and Twice distemper. |
| 16/ | 16 | Mitres 6 in. cornice. |
| 1/ | 1 | Ditto, irregular. |

*A Collection of Flashings.*

It will generally be expedient to collect all the general flashings to a roof in one collection, omitting those to chimneys.

| | | S. F. | Apron. | Flashg. |
|---|---|---|---|---|
| Eastern and western gable | 2/20 | 0 = 40 0 | | 3 0 |
| South of dormitory | | | 10 0 | |
| S.E. angle of main roof | | 4 6 | | 15 0 |
| | | 4 6 | 10 0 | 21 0 |

| | | |
|---|---|---|
| 21 0<br>5 | 8 9 | 5 lb. lead<br>Flashings. |
| 44 6<br>1 0 | 44 6 | 5 lb. lead<br>Steppd. flashing. |
| 10 0<br>1 0 | 10 0 | 5 lb. lead<br>Apron. |

10 0
21 0
31 0

| | | |
|---|---|---|
| 31 0 | 31 0 | R. O. & P. flashing with Ct.<br>and<br>Lead wedging. |
| 44 6 | 44 6 | R. O. & P. S. F. with Ct.<br>and<br>Lead wedging. |

### *A Collection of Labour and Materials connected with Chimney-gutters, Flashings, &c.*

| | Flashg. | Apron. | S. F. | Gutter. | T. F. | Roll. |
|---|---|---|---|---|---|---|
| Stack over B. R. 4 | 2 5 | 2 5 | 4 9<br>4 9 | 2 5 | 2 5 | 1 |
| S. W. stack | 2 5 | 2 5 | 6 0<br>6 0 | 2 5 | 2 5 | 1 |
| S. E. stack | | 2 5<br>2 5 | 9 6<br>9 6 | | | |
| | 4 10 | 9 8 | 40 6 | 4 10 | 4 10 | 2 |

| | | | |
|---|---|---|---|
| | 4 10<br>5 | 2 0 | 5 lb. lead<br>Flashg. |
| | 9 8<br>1 0 | 9 8 | 5 lb. lead<br>Apron. |
| | 40 6<br>1 0 | 40 6 | 5 lb. lead<br>Steppd. flashg. |
| | 4 10 | 4 10 | 1 in. deal gutter boards and bearers 6 in. wide average. |
| 2/ | | 2 | Short lengths of 2 in. deal roll. |
| | 4 10 | 4 10 | Deal tilting fillet. |

Width = 6 in.
Turns up = 6 in.
9 in.
—
21

4 10
Ends 4/9 in. = 3 0
Roll 2/6 in. = 1 0
——
8 10

| | | | |
|---|---|---|---|
| | 8 10<br>1 9 | 15 6 | 6 lb. lead gutter. |
| 2/ 2/ | | 4 | Bossed end to rolls. |

Flashings 4 10
Apron 9 8
——
14 6

| | | | |
|---|---|---|---|
| | 14 6 | 14 6 | R. O. & P. flashings with Ct.<br>and<br>Lead wedging. |
| | 40 6 | 40 6 | R. O. & P. S. F.<br>and<br>L. W. |

## *A Collection of Rain-water Pipes.*

### RAIN-WATER PIPES.

| | R. W. P. | | Heads & C. W. Covers. | Shoes. | Plinth bends. | Swan necks 4½ projn. | Cutting bk., string, &c., 6 in. high. | Cutting string 3 in. high. |
|---|---|---|---|---|---|---|---|---|
| North of dining-room | 24 | 0 | 1 | 1 | 1 | | 2 | 3 |
| N. E. of ditto | 30 | 0 | 1 | 1 | 1 | 1 | 3 | 2 |
| East of ditto | 30 | 0 | 1 | 1 | | | | 2 |
| | 30 | 0 | 1 | 1 | | 1 | | 2 |
| | 114 | 0 | 4 | 4 | 2 | 2 | 5 | 9 |

| | | |
|---|---|---|
| 114 0 | 114 0 | 4 in. C. I. R. W. P. with ears cast on and fixing with rose-headed nails to and including oak plugs in brickwork. |
| 4/ | 4 | Heads<br>and<br>Strong copper wire covers to R. W. P. heads. |
| 4/ | 4 | Shoes. |
| 2/ | 2 | Plinth bends. |
| 2/ | 2 | Swan necks 4½ in. projn. |
| 5/ | 5 | Labour cutting brick-moulded string 6 in. high for passage of R. W. P. & M. G. |
| 9/ | 9 | Ditto 3 in. high. |

Collect eaves gutters in a similar manner.

## *A Collection of Bells.*

| | Bells. | Lever pulls. | Ceiling pulls. | Sunk plate pulls. |
|---|---|---|---|---|
| Bedroom 3 | 1 | | 2 | |
| " 4 | 1 | | 2 | |
| Room 6 | 1 | 1 | | |
| Dining-room | 1 | 2 | | |
| Drawing-room | 1 | 2 | | |
| Landing (call bell) | 1 | 1 | | |
| Front entrance | 1 | | | 1 |
| Servants' ditto | 1 | | | 1 |
| | 8 | 6 | 4 | 2 |

8/ 8 Bells with six lever pulls, four ceiling pulls, and two plate pulls.
(A sum elsewhere provided for the pulls.)

Provide for six lever pulls, four ceiling pulls, and two sunk plate pulls and fixing .. .. .. .. .. .. .. ..£

# CHAPTER XIII.

## EXAMPLES OF TAKING OFF.

### *Excavation and Brickwork.*

FIG. 29, shows a plan and section of wall of a dwelling-house.

| | | |
|---|---|---|
| | 40 0 | 42 0 |
| Beyond base of wall. | 2 0 | 2 0 |
| | 2 0 | 2 0 |
| | 44 0 | 46 0 |

| | | |
|---|---|---|
| 46 0<br>44 0 | 2024 0 | Excavation 12 in. deep to surface, and wheeling and depositing where directed on the site at an average of two runs, and including separating vegetable soil. (Main Block). |

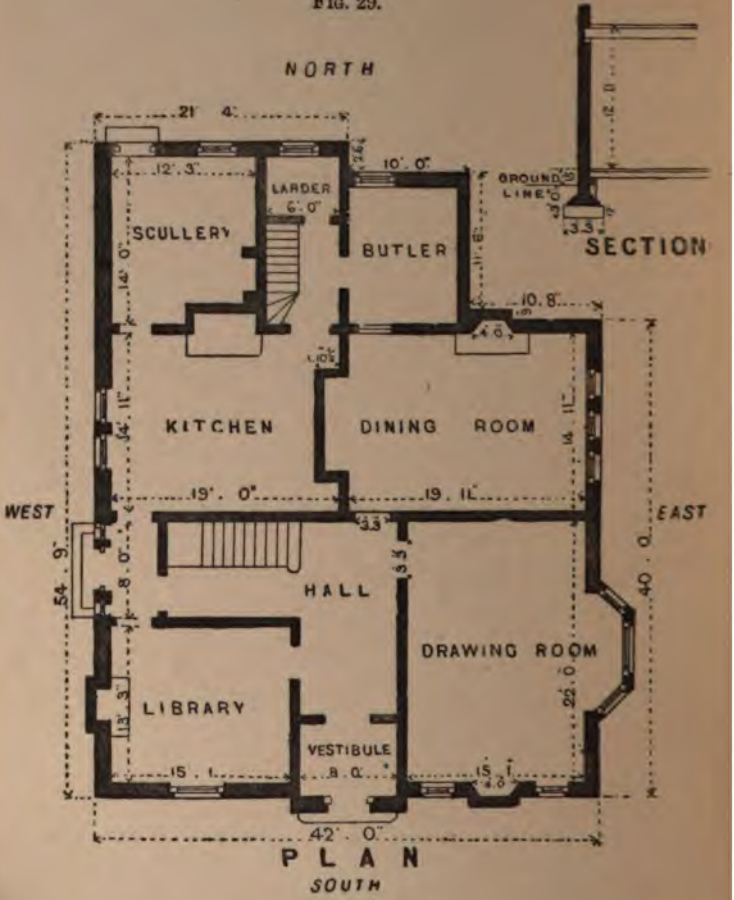
| | |
|---|---|
| | 21 4 |
| 9 | 10 0 |
| 11 6 | 2 0 |
| 2 6 | 2 0 |
| 14 9 | 35 4 |

| | | |
|---|---|---|
| 35 4<br>14 9 | 521 2 | Add Offices. |

### *External Walls.*

Assumed to be carried up uniformly to first floor level. Measure each wall to its extremity. If this course is always adopted, the surveyor will never be in doubt as to how far he has measured.

Fig. 29.



In the case of a rectangular building of 1½ brickwork and 50′ × 30′ external dimensions, the front and back wall would be taken from outside to outside, and the end walls in clear, thus:—

50 0
50 0
27 8
27 8
———
155 4

| | | |
|---|---|---|
| South of drawing-room | 17 | 0 |
| South of porch | 9 | 6 |
| South of library | 17 | 0 |
| Western wall | 53 | 7 |
| Northern wall | 20 | 2 |
| East of larder | 2 | 6 |
| North of butler | 10 | 0 |
| East of ditto | 12 | 3 |
| North of dining-room | 10 | 8 |
| Eastern wall | 37 | 8 |
| | 190 | 4 |

190 4
3 3
1 0
——— 618 7 Excavation to surface trenches, wheeling and depositing as before,
and
Concrete.

Note.—Things intended to be separately abstracted should begin on a fresh line, as shown in the foregoing item.

2 0
Ddt. surface digging 1 0
———
1 0

190 4
3 3
1 0
——— 618 7 Excavation to surface trenches P. F. I. and R., the remainder wheeled and deposited as before.

2 B.
2½ B.
3 B.

3) 7½

2½ Bk. av.

190 4
9
142 9 2½ B.

foots.
12 0
1 3
1 3

14 6

190 4
14 6
2759 10 1½ B.

From foots to first floor level.

### *Internal Walls.*

Assumed to be carried down to the same level as external walls with 12 inches of concrete and two courses of footings.

| | | |
|---|---|---|
| South of larder.. .. .. .. .. .. .. .. | 7 | 6 |
| South of scullery and butler .. .. .. .. | 29 | 0 |
| South of kitchen and dining-room .. .. | 39 | 8 |
| North of library .. .. .. .. .. .. .. | 15 | 10 |
| North of vestibule .. .. .. .. .. .. .. | 9 | 6 |
| East of scullery .. .. .. .. .. .. .. | 13 | 3 |
| West of butler. *Colld.* .. .. .. .. .. .. | 10 | 9 |
| West of dining-room *Colld.* .. .. .. | 18 | 8 |
| East of western entrance .. .. .. .. | 8 | 0 |
| East of library .. .. .. .. .. .. .. .. | 12 | 3 |
| West of drawing-room .. .. .. .. .. | 21 | 3 |
| | 185 | 8 |

| | | |
|---|---|---|
| 185 8<br>2 6<br>1 0 | 464 2 | Excavation to surface trenches, wheel and deposit as before,<br>and<br>Concrete. |
| 185 8<br>2 6<br>1 0 | 464 2 | Excavation P. F. I. and R., &c. a. b. |
| 185 8<br>6 | 92 10 | 1¾ B.<br>Foots. |
| 185 8<br>14 9 | 2738 7 | 1 B.<br>To first floor level. |

The collection forming the basis of the foregoing dimensions has been made on the principle of measuring the horizontal lines first and afterwards the vertical ones, and does fairly well for a small work; but in the case of a large building this would confuse the majority, and such a plan as the following is better: assume that the work is divided into two sections by the wall south of kitchen and dining-room, measure this wall first, and proceed as before; measuring next the walls north of the latter and then those south of it.

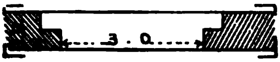
| | |
|---|---|
| South of kitchen and dining-room .. .. | 39 8 |
| South of scullery and butler .. .. .. .. | 29 0 |
| South of larder .. .. .. .. .. .. | 7 6 |
| East of scullery .. .. .. .. .. .. .. | 13 3 |
| West of butler .. .. .. .. .. .. .. .. | 10 9 |
| West of dining-room .. .. .. .. .. .. | 18 8 |
| North of library .. .. .. .. .. .. .. | 15 10 |
| North of vestibule .. .. .. .. .. .. .. | 9 6 |
| East of western entrance .. .. .. .. .. | 8 0 |
| East of library .. .. .. .. .. .. .. .. | 12 3 |
| West of drawing-room .. .. .. .. .. .. | 21 3 |
| | 185 8 |

The bay window is assumed to go no higher than the ground floor, and is best taken immediately after the deduction of opening leading into it. In a case where a bay goes up several stories, its foundations and brickwork would be collected with the general collection.

For chimney breasts and backs, see "Order of Taking off."

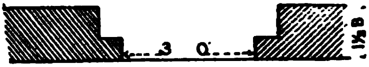
Deduction of openings 3′ × 6′ in clear in 1 bk. and 1½ bk. walls respectively.

FIG. 30.



A.

FIG. 31.



B.

| | | | |
|---|---|---|---|
| | 6 0 | 6 0 | 3 0 |
| half reveal | 1¼ | 3 | 4½ half the reveals. |
| | 6 1¼ | 6 3 | 3 4½ |

| | | | |
|---|---|---|---|
| **A.** | 3 4<br>6 1 | 20 3 | Ddt. 1 bk. |
| **B.** | 3 0<br>6 0 | 18 0 | Ddt. ½ bk. |
| | 3 9<br>6 3 | 23 5 | Ddt. 1 bk. |

### FACINGS.

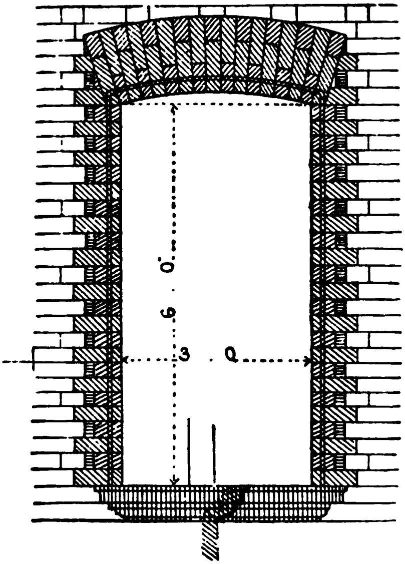
See also remarks in section on "Billing."

#### *A Window with Brick Dressings.*

The deduction of brickwork having been taken with general brickwork. Assumed depth of reveal 4½ inches.

**General facings, picked stocks, dressings—red bricks.**

FIG. 32.



3 0 | 6¾ | Length of Quoins.
9 | 9
9 | 11¼
4 6 | 3) 27

Average 9

4 6
6 0
27 0 Deduct facings of picked stocks, as described.

Average of face 9
Reveal 4½
13½

2/ 1 2
6 0
14 0 Facings of red bricks, as described, finished with a neatly struck joint.

Jambs.

| | | | | |
|---|---|---|---|---|
| 2/ | 4 average.<br>1 0 | 8 | Add<br>and<br>Ddt. picked stock facings at skewbacks. | 3 1 intrados.<br>4 2 extrados.<br>2) 7 3<br>3 7½ mean. |
| | 3 8<br>1 0 | 3 8 | Ddt. picked stock facings for arch. | |
| | 3 8<br>1 0 | 3 8 | Rubbed and gauged arch in red bricks, set in cement, raked out and pointed to match facings. | |
| | 3 1<br>4½ | 1 2 | Face and soffit. | Skewback 1 0<br>„ 1 0<br>Extrados 4 2<br>6 2 |
| | 6 2 | 6 2 | 4½-in. circular and skewback cutting to facings. | |
| 2/ | 6 3 | 12 6 | Labour cut and rubbed moulding, 4-in. girth on facings. | Jambs. |
| | 3 5 | 3 5 | Ditto, circular. | Arch. |
| | 2/ | 2 | Mitres. | |
| 2/ | 7 0 | 14 0 | Extra labour to bonding quoins. | Jambs. |

or, instead of last item, write in bricklayer's bill—

"All the red facings to include any extra labour for bonding with the general facings."

| | | | |
|---|---|---|---|
| 3 6<br>6 | 1 9 | ½ Bk | Oversail for sill average |

| | | | |
|---|---|---|---|
| | 3 6<br>6 | 1 9 | Ddt. facings of picked stocks. |
| | 4 0<br>11 | 3 8 | Red facings, top of sill. |
| | 4 0<br>10 | 3 4 | „ front of ditto (girth). |
| | 4 0 | 4 0 | Extra labour on facings for two courses of moulded bricks, as sill, including setting out. |
| 2/ | | 2 | Returned and mitred ends. |

See also modes of measurement, “Facings,”

### *A Chimney Stack* (Fig. 33).

All the mouldings to be cut and rubbed

4 4
4 4
2 3
2 3
5 3
5 3
3 1
3 1
2) 29 10
14 11

| | | | |
|---|---|---|---|
| | 14 11<br>1 6 | 22 5 | ½ B (averaged). |

Oversail for cap.

2/ 3 9 = 7 6
4/ 1 2 = 4 8
12 2

| | | | |
|---|---|---|---|
| | 12 2<br>5 | 5 1 | Red facing as described. |
| 6/ ½/ | 9<br>5 | 11 | |

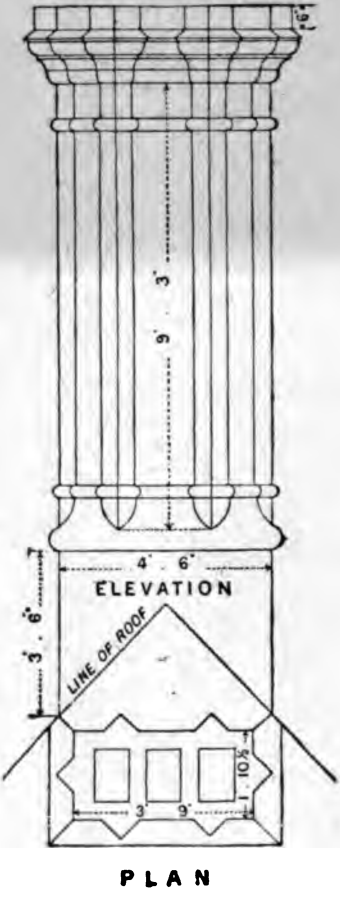
Top.

2/ 5 3 =
2/ 3 1 =

16 8
6
8 4 Facings a. b.

Above c

Fig. 33.



| | | | |
|---|---|---|---|
| | 6/ | 6 | Extra labour on facings for forming pilasters triangular on plan 9 in. wide 5 in. projection and 6 in. high, including cutting. |
| | 14 11<br>1 6 | 22 5 | Facings a. b. |
| | | | Cornice. |
| | 14 11 | 14 11 | Extra labour on facings for moulding 18 in. girth in short lengths, including setting out. |
| | 10/ | 10 | Mitres to 18 in. moulding. |
| 6/ | 2/ | 12 | Irregular ditto. |
| 6/ ½/ | 9<br>9 3 | 20 10 | ½ Bk. |
| | | | Projection for pilasters. |
| | | | 2/ 4 4 = 8 8 Necking 9<br>2/ 2 3 = 4 6 Shaft 7 6<br>Two mouldgs. 5<br>5<br>13 2 9 1 |
| | 13 2<br>9 1 | 119 7 | Facings a. b. |
| 2/ | 13 2<br>3 | 6 7 | ½ Bk. |
| | | | Projn. of mouldgs. |
| 2/ | 13 2 | 26 4 | Extra labour on facings for moulding one course high, including setting out in short lengths. |
| 2/ | 10/ | 20 | Mitres. |
| 2/ | 12/ | 24 | Irregular ditto. |
| 6/ | 9 3 | 55 6 | Extra labour on facings for forming pilasters 9 in. wide 5 in. projn. a. b. |
| 6/ | 1/ | 6 | Stopped ends to ditto on moulded face |
| | | | 2/ 4 10 = 9<br>2 7 = 5 2<br>14 10 |
| | 14 10<br>6 | 7 5 | ½ Bk. |
| | | | Projn. for base moulding.<br>x 2 |

3 9
3 9
1 10½
1 10½
4 10
4 10
3 0
3 0
2) 26 11
13 5½

| | | | | |
|---|---|---|---|---|
| | 13 6 | 13 6 | Lab. to moulding 16 in. girth. | |
| 4/ | | 4 | Mitres. | Base moulding. |
| | 13 6<br>1 4 | 16 11 | Facings as described. | Base moulding. |
| 6/ ½/ | 9<br>9 | 1 8 | Ddt. facings | Stoppings of pilasters. |
| 6/2/½/ | 6<br>9 | 2 3 | Facings as described. | Sides of ditto. |

3 6
Below surface of roof 3
3 9

| | | | | |
|---|---|---|---|---|
| 2/ | 2 8<br>3 9 | 20 0 | Add. | Base. |

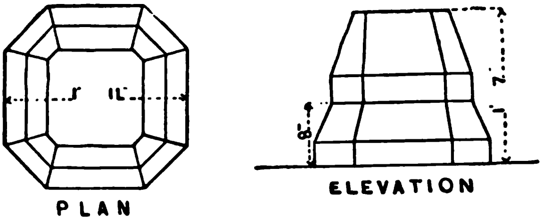
Mean 2 3
3
2 6

| | | | | |
|---|---|---|---|---|
| 2/ | 4 6<br>2 6 | 22 6 | Add. | Ditto. |

In the measurement of the carcase of the building the shaft would be measured without its projections, leaving them to be taken with the facings as in the foregoing dimensions.

*A Stone Pier Cap in Two Stones.*

Fig. 34.



1 11
1 11
8
—— 2 5 Box Ground stone.

Pier cap.
Lower stone.

1 11
1 11
—— 3 8 Bed.

Top and bottom.

1 11
8
—— 1 3 Joint.

Sides.

4/ 1 0
3
—— 1 0 P. F.

Sides.

4/ 8
8
—— 1 9 S. F.

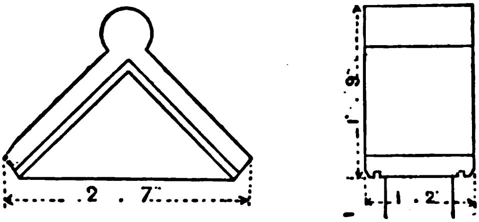
(The whole height at angles.)

In the measurement of labour, small dimensions like the foregoing must be liberally treated.

| | | | | |
|---|---|---|---|---|
| | | | | 4/ 1 0 = 4 0 |
| | | | | 4/ 8 = 2 8 |
| | | | | 6 8 |
| | 6 8 | | | |
| | 5 | 1 9 | S. F. | Weathg. |
| 8/ | 7 | 4 8 | Mitre to splay. | |
| | 1 6 | | | |
| | 1 6 | | | |
| | 11 | 2 1 | B. G. stone. | Upper stone. |
| | | | | Bed 1 6 |
| | | | | Joint 11 |
| | | | | 2 5 |
| | 2 5 | | | |
| | 1 6 | 3 8 | B. and J. | |
| 4/ | 10 | | | |
| | 3 | 10 | P. F. | Sides. |
| 4/ | 5 | | | |
| | 11 | 1 6 | S. F. | (The whole height at angles.) |
| | | | | 4/ 10 = 3 4 |
| | | | | 4/ 5 = 1 8 |
| | | | | 5 0 |
| | 5 0 | | | |
| | 8 | 3 4 | S. F. | |
| | 11 | | | |
| | 11 | 10 | P. F. | Top. |
| 8/ | 8 | 5 4 | Mitre to splay. | |
| | 2/ | 2 | 3" × 1" × 1", slate dowels, mortises and cement. | |

### *An Apex Stone.*

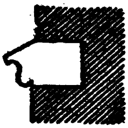
FIG. 35.



| | | | |
|---|---|---|---|
| | 2 7<br>1 2<br>1 9 | 5 3 | Box Ground stone. |
| | 2 7<br>1 2 | 3 0 | Bed. |
| 2/ ½/ | 2 7<br>1 9 | 4 6 | P. F.<br>Front and back. |
| 2/ | 1 2<br>3 | 7 | Sunk joint. |
| 2/ | 1 7<br>1 2 | 3 8 | S. F.<br>and<br>R. S. |
| 2/ ½/ | 2 3<br>1 2 | 2 8 | Sunk work stopped.<br>(Back and front.) |
| 2/ 2/ | 1 7 | 6 4 | Sunk and stopped margin, 2 in. wide. |
| 2/ 2/ | 1 9 | 7 0 | Moulding 3 in. girth stopped.<br>(Throat and chamfer.) |
| 2/ | | 2 | Mitres to 3 in. moulding. |
| | 1 2<br>1 2 | 1 4 | Mo. face.<br>Roll. |

### *A Stone String Course.*

FIG. 98.



Exposed for a length of 50 feet, and running into wall 6 inches at one end. The stones alternately 4½ and 9 inches into wall.

| | | | |
|---|---|---|---|
| | 4½<br>9 | | |
| | 2) 13½ | | |
| | 6¾ | | |
| | Projn. 4 | | |
| | 10¾ | | |

| | | | |
|---|---|---|---|
| | 50 6<br>11<br>6 | 23 2 | Box Ground stone. |

String.

| | | | |
|---|---|---|---|
| | 50 6<br>11 | 46 4 | Bed. |
| 17/ | 11<br>6 | 7 9 | Joint. |
| | 50 6<br>6 | 25 3 | ½ joint. |

Back.

NOTE.—The back is often left rough, in which case no labour need be taken thereon.

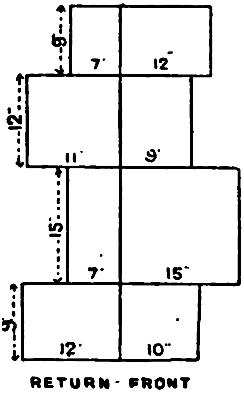
| | | | |
|---|---|---|---|
| | 50 0<br>1 0 | 50 0 | Mo. F. |
| | 2 6<br>1 0 | 2 6 | Ddt. Mo. F.<br>and<br>Add Mo. F. stopped. |
| 1/ | | 1 | Stopped end to mo., 12 in. girth. |

6
6
—
12

1 0
6
—— 6 ½ joint.

### *Stone Quoins.*

Fig. 37.



Usually averaged, this will sometimes produce a rather larger quantity than squaring each stone, but is close enough for all practical purposes, the long and short dimensions must be respectively added together for the average. The correct and incorrect averages are shown below. In this instance, either process produces very nearly the same result, but in many cases the products are widely different.

| Correct. | | Incorrect. | |
|---|---|---|---|
| 7 | 12 | 7 | 12 |
| 9 | 11 | 11 | 9 |
| 7 | 15 | 7 | 15 |
| 10 | 12 | 12 | 10 |
| 4) 33 | 4) 50 | 4) 37 | 4) 46 |
| 8¼ | 12½ | 9¼ | 11½ |

1 1
9
3 9
—— 3 1 Box Ground stone.

Quoins in four stones.

4/ 1 1
9
—— 3 3 Bed.

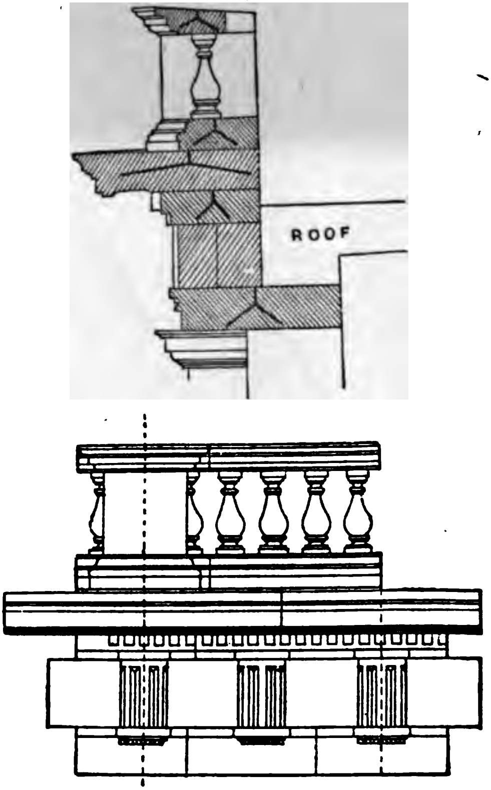
1 1
9
1 10

1 10
8 9
6 11 ½ joint
and
P. F.

Faces and backs

### *A Stone Balustrade and Entablature.*

FIG. 38.



| | | | | |
|---|---|---|---|---|
| | 5 9<br>2 7<br>8 | 9 11 | Portland stone. | |
| | | | | Architrave in three stones. |
| | 5 9<br>2 7 | 14 10 | Bed. | |
| 3/ | 2 7<br>8 | 5 2 | Joint. | |
| 3/ | 1 2 | 3 6 | Double V joggle pebbles and cement. | |
| | 5 9<br>8 | 3 10 | P. F. | |
| | | | | Back |
| | 5 9<br>7 | 3 4 | S. F. stopped. | |
| | | | | Front. |
| | 5 9 | 5 9 | Narrow margin. | |
| | | | | Face of fillet.<br>2/ 1 1 = 2 2<br>2/ 7 = 1 2<br>3 4 |
| | 3 4 | 3 4 | Ddt.<br>and<br>Add narrow margin, sunk and stopped. | |
| 6/ | 1/ | 6 | ½ in. length of ditto, with one external and one internal mitre to each. | |
| | | | | Return of fillet. |
| | 5 9 | 5 9 | Narrow sunk margin. | |
| | | | | Underside of fillet. |
| | 3 4 | 3 4 | Ddt.<br>and<br>Add stopped. | |

| | | | |
|---|---|---|---|
| 3/ | | 3 | 9 in. length of narrow sunk margin with two ½ in. returns, two mitres, and two stopped ends to each. |
| 3/ | | 3 | Labour to guttæ 9 in. long, 1 in. high, ½ in. projection. |
| | 6 9<br>1 5<br>1 1 | 10 4 | Portland stone. |
| | | | Frieze in two stones. |
| | 6 9<br>1 5 | 9 7 | Bed. |
| 2/ | 1 5<br>1 1 | 3 1 | Joint. |
| | 6 9<br>1 1 | 7 4 | ½ joint<br>and<br>P. F. |
| | | | (Back and front.) |
| 3/ | 1 1 | 3 3 | Joggle and cement a. b. |
| 4/ | 1 2<br>1 1 | 5 1 | S. F. stopped<br>and (between triglyphs)<br>Ddt. P. F. |
| 6/ | 1 1 | 6 6 | Narrow sunk margin. |
| | | | Return of triglyphs. |
| 3/ 2/ 1/ | | 6 | 12 in. lengths of arris groove ½ in. deep 1½ in. wide, stopped, and with one splayed stop to each. |
| | | | Channels of triglyphs. |
| 3/ 2/ 1/ | | 6 | 12 in. lengths of stopped chamfer 1 in. wide, with one splayed stop to each. |
| | | | Outer edges of triglyphs. |
| | 5 9<br>1 8<br>7 | 5 7 | Portland stone. |
| | | | Bed mould in three stones. |

| | | | |
|---|---|---|---|
| | 5 9<br>1 8 | 9 7 | Bed. |
| 3/ | 1 8<br>7 | 2 11 | Joint. |
| 4/ | 10 | 3 4 | Joggle and Ct. a. b. |
| | 5 9<br>7 | 3 4 | P. F. |
| | | | Back. |
| | 5 9<br>10 | 4 10 | Mo. F. |
| | | | 7<br>13<br>13<br>7<br>40 |
| | 3 4 | 3 4 | Labour to stopped sinking 2 in. wide and ¾ in. deep in short lengths. |
| | | | To form upper fillet of triglyphs. |
| | 6/ | 6 | ½ in. lengths of ditto, with one external and one internal mitre to each. |
| | | | Returns of do. |
| | 5 9 | 5 9 | Labour to dentil course 4 in. high, the blocks 2 in. wide, 3½ in. high, and 1 in. apart. |
| | 7 6<br>2 10<br>9 | 15 11 | Portland stone. |
| | | | Cornice in two stones. |
| | 7 6<br>2 10 | 21 3 | Bed. |
| 2/ | 2 10<br>9 | 4 3 | Joint. |

| | | | | |
|---|---|---|---|---|
| | 7 6<br>1 8 | 12 6 | Sunk bed. | |
| | | | | Underside. |
| | 7 6<br>8 | 5 0 | P. F. | |
| | | | | Back. |
| | 7 6<br>1 3 | 9 5 | S. F. | |
| | 5 8<br>4 | 1 11 | | |
| | | | | Top.<br>1 4<br>1 4<br>2 8 |
| | 2 8<br>4 | 11 | Ddt. S. F.<br>and<br>Add S. F. stopped. | |
| 2/ | 4 | 8 | Stopped end to splay. | |
| | 7 6<br>1 10 | 13 9 | Mo. F. | |
| 3/ | 2 0 | 6 0 | Joggle and Ct. a b. | |
| | 2 9<br>1 4<br>6 | 1 10 | Portland stone. | |
| | | | | Base of balustrade.<br>2 9<br>6<br>3 3 |
| | 3 3<br>1 4 | 4 4 | Bed and joint. | |
| | 2 9 | 2 9 | 2½ in. plain margin. | |
| | | | | Front. |

| | | | | |
|---|---|---|---|---|
| | 2 9<br>6 | 1 5 | P. F. | Back. |
| | 2 9<br>1 0 | 2 9 | P. F.<br>and<br>Ddt. ½ Bed. | Top. |
| | 2 9 | 2 9 | Mo. 6 in. girth. | |
| | 2 2<br>1 8<br>6 | 1 10 | Portland stone. | Base to pedestal.<br>2 2<br>6<br>2 8 |
| | 2 8<br>1 8 | 4 5 | Bed and joint. | |
| | 2 2<br>6 | 1 1 | P. F. | Back. |
| | 1 10 | 1 10 | 2½ in. margin. | Front.<br>1½<br>4½<br>6 |
| 2/ | 6 | 1 0 | 2½ in. ditto, sunk and stopped. | Returns. |
| | 1 10 | 1 10 | Moulding 6 in. girth. | Front. |
| 2/ | 6 | 1 0 | Ditto, stopped in short lengths. | Returns. |

| | | | | |
|---|---|---|---|---|
| 2/ 2/ | | 4 | Mitres to 6" mo. | |
| 2/ | 5 | | | |
| | 1 0 | | | |
| | —— | 10 | P. F. | |
| | | | | Top. |
| 3/ | 9 | | | |
| | —— | 2 3 | Joggle and Ct. a. b. | |
| 4/ | 6 | | | |
| | 6 | | | |
| | 1 5 | | | |
| | —— | 1 5 | Portland stone. | |
| | | | | Balusters. |
| 4/ | 6 | | | |
| | 6 | | | |
| | —— | 1 0 | Bed. | |
| 4/ 4/ | 6 | | | |
| | 1 5 | | | |
| | —— | 11 4 | P. F. | |
| | | | | Preparatory faces. |
| 4/ | 1 1 | | | |
| | 1 5 | | | |
| | —— | 6 2 | Mo. F. circular continuous to balusters. | |
| or 4/ | | 4 | Turning and labour to stone balusters, 6" × 6" and 17" high, instead of last. | |
| 4/ 2/ | | 8 | 3" × 1" × 1" slate dowels, mortises, and cement. | |

Or the balustors may be taken as follows:

| | | | | |
|---|---|---|---|---|
| 4/ | | 4 | Portland stone and labour to moulded balusters 6" × 6" and 17" high. | |
| | 1 11 | | | |
| | 1 5 | | | |
| | 1 5 | | | |
| | —— | 3 10 | Portland stone. | |
| | | | | Die of pedestal. |
| | | | | Bed 1 11 |
| | | | | Joint 1 5 |
| | | | | —— |
| | | | | 3 4 |
| | 3 4 | | | |
| | 1 5 | | | |
| | —— | 4 9 | Bed and joint. | |
| | | | | (Top, bottom, and sides.) |

2/ 1 4
1 5
—— 3 9 P. F.

Front and back.

2/ 2/ 6
1 5
—— 2 10 S. F. stopped.

Sides.
3
3
6
—
12

2/ 1 0
1 5
—— 2 10 S. F. stopped.

Prepy. face for half balusters.

2/ 7
1 5
—— 1 8 Mo. F. circular stopped.

To balusters.

2/ 2/ 1 5
—— 5 8 Stopped end to Mo.

2 8
1 1
5
—— 1 2 Portland stone.

Capping.

2 8
1 1
—— 2 11 Bed.

1 1
5
—— 5 Joint.

2 8
4
—— 11 P. F.

Back.

8
8
—— 1 9 P. F.
and
Ddt. ½ bed.

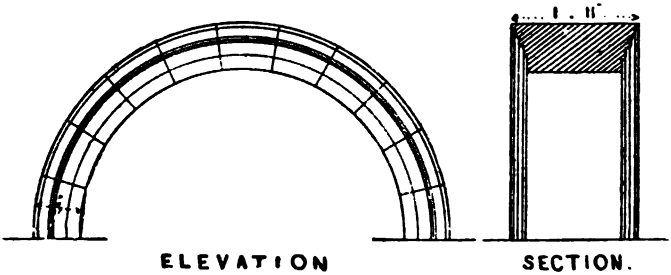
Soffit.

| | | | | |
|---|---|---|---|---|
| | 2 8 | 2 8 | Mo. 6 in. girth. | Front. |
| | 2 8<br>1 1 | 2 11 | S. F. | Top. |
| | 2 1<br>1 9<br>5 | 1 6 | Portland stone. | Capping to pedestal. |
| | 2 1<br>1 9 | 3 8 | Bed. | |
| | 1 9<br>5 | 9 | Joint. | |
| | 2 1<br>4 | 8 | P. F. | Front part of top |
| | 2 1<br>1 5 | 2 11 | S. F. | Remr. of top. |
| 2/ | 5<br>8 | 7 | P. F.<br>and<br>Ddt. ½ bed. | Soffit. |
| | 2 1<br>4 | 8 | P. F. | Back. |
| | 2 1 | 2 1 | Moulding 6 in. girth. | Front. |
| 2/ | 5 | 10 | Do. 6 in. girth stopped in short lengths. | Returns. |

| | | | | |
|---|---|---|---|---|
| 2/ 2/<br>3/ | 4<br>7 | 1 9 | Mitres.<br>Joggle and Ct. a. b. | |

### *A Stone Arch.*

Fig. 39.



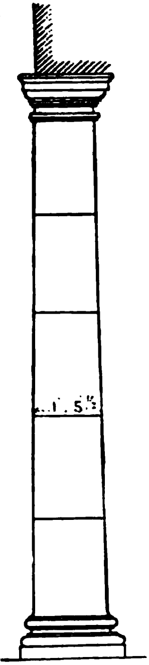
Extrados = 10 5
Intrados = 8 3

| | | | | |
|---|---|---|---|---|
| | 10 5<br>1 11<br>9 | 15 0 | Portland stone. | Arch in eleven stones. |
| 11/ | 9<br>1 11 | 15 10 | Bed. | |
| 11/ | 9<br>1 11 | 15 10 | Sunk bed. | |
| | 10 5<br>1 11 | 20 0 | Circular joint. | Extrados. |
| | 8 3<br>1 7 | 13 1 | S. F. circular. | Soffit. |

| | | | | |
|---|---|---|---|---|
| 2/ | 9 4<br>1 1 | 20 8 | Moulded F. circular. | 10 5<br>8 3<br>2)18 8<br>9 4<br>Faces of arch |

### *A Stone Column.*

FIG. 40.



| | | | | |
|---|---|---|---|---|
| | 1 11<br>1 11<br>10 | 3 1 | Portland stone. | |
| | | | Capital. | |
| | 1 11<br>1 11 | 3 8 | Bed. | |
| | 1 11<br>10 | 1 7 | Joint. | |
| | 1 4<br>4 | 5 | P. F.<br>and<br>Ddt. ½ bed. | |
| | | | Top. | |
| 4/ | 1 11<br>9 | 5 9 | Mo. F. | |
| | 4/ | 4 | Mitres to 9 in. mo. | |
| 4/ ½/ | 11<br>11 | 1 8 | S. F. stopped. | (Angles of underside of abacus.) |
| | 5 6<br>7 | 3 3 | Circular sunk joint. | Prepy. faces. |
| | 4 8<br>11 | 4 3 | Mo. F. | Circular continuous to cap of column. |

Diar. {1 8
1 3
2 11
1 5½ av.

| | | | |
|---|---|---|---|
| | 1 6 | | |
| | 1 6 | | |
| | 10 4 | | |
| | | 23 3 | Portland stone. |
| | | | Shaft in five stones (average size). |
| 5/ | 1 6 | | |
| | 1 6 | | |
| | | 11 3 | Bed. |
| 2/ | 1 6 | | |
| | 10 4 | | |
| | | 31 0 | Joint. |
| | 4 5 | | |
| | 10 4 | | |
| | | 45 8 | Circular S. F. |
| | | | In shaft of column. |

If with entasis call it circular S. F., to swelled and diminished shafts.

| | | | |
|---|---|---|---|
| | 2 1 | | |
| | 2 1 | | |
| | 10 | | |
| | | 3 7 | Portland stone. |

Base.
2 1
10
2 11

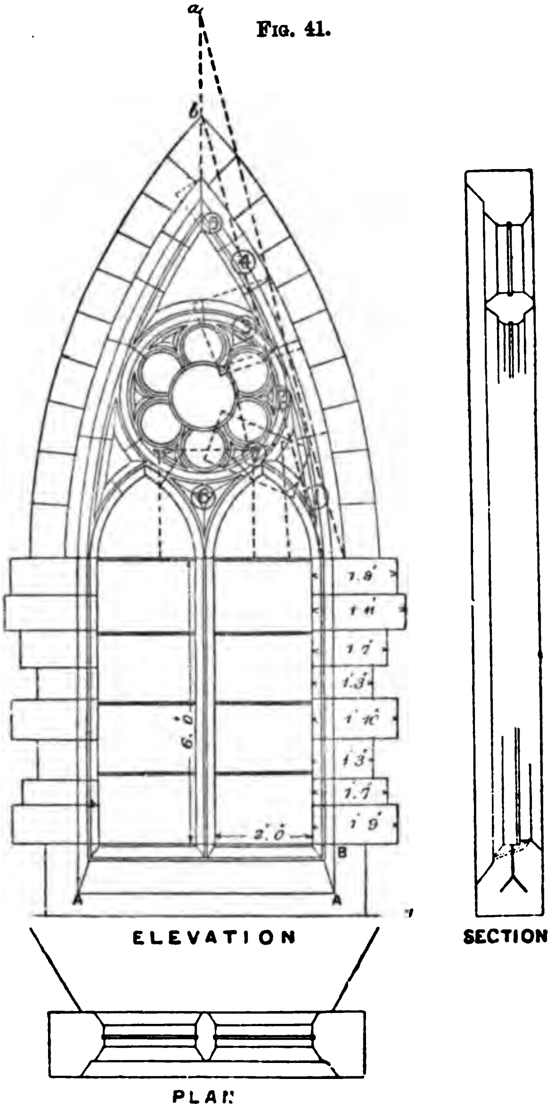
| | | | |
|---|---|---|---|
| | 2 11 | | |
| | 2 1 | | |
| | | 6 1 | Bed and joint. |
| 4/ | 2 1 | | |
| | 10 | | |
| | | 6 11 | P. F. |
| | | | The whole height. |
| | 6 7 | | |
| | 7 | | |
| | | 3 10 | Circular sunk joint. |

| | | | |
|---|---|---|---|
| | | | 2 1<br>1 7<br>3 8<br>av. diar. 1 10 |
| | 5 10<br>11 | 5 4 | Mo. F. circular, continuous to bases.<br>To bases. |
| 4/ ½/ | 1 0<br>1 0 | 2 0 | S. F. stopped.<br>Top of plinth. |
| 6/ | 2/ | 12 | 3" × 1" × 1" slate dowels, mortises, and Ct. |

## *A Traceried Window* (Fig. 41).

| | | | |
|---|---|---|---|
| | 6 8<br>1 4<br>1 6 | 13 4 | Box Ground stone.<br>Sill in two stones. |
| | 6 8<br>1 4 | 8 11 | Bed. |
| 2/ | 1 4<br>1 6 | 4 0 | Joint. |
| | 1 6 | 1 6 | Double V joggle pebbles and cement. |
| | | | Back 1 3<br>Front 7 |
| | 6 8<br>1 10 | 12 3 | P. F.<br>Front. |
| 2/ | 8<br>1 0 | 1 4 | Add.<br>At ends of front. |

Fig. 41.


a
b
3
4
5
6
7
1.8
1 11
1 7
1 3
1 10
1 3
1 7
1 9
6.0
2.0
B
A
A
ELEVATION
SECTION
PLAN

| | | | | |
|---|---|---|---|---|
| | 6 8 | | | |
| | 6 | 3 4 | P. F. | Top. |
| | 5 4 | | | |
| | 1 2 | 6 2 | S. F. stopped<br>and<br>Rough sunk. | Front weathering. |

**Note.**—The length of the foregoing being measured from A to A gives sufficient to include from A to B, as also the sunk work to stool of mullion.

| | | | | |
|---|---|---|---|---|
| | 4 9 | | | |
| | 4 | 1 7 | Sunk F. stopped. | Splay inside. |
| 2/ | 1 4 | 2 8 | Labour mitre to splay. | |
| 6/ | 5 | 2 6 | | |
| | | | | 1 9 |
| | | | | 1 7 |
| | | | | 1 3 |
| | | | | 1 10 |
| | | | | 1 3 |
| | | | | 1 7 |
| | | | | 1 11 |
| | | | | 1 9 |
| | | | | 8) 12 11 |
| | | | | 1 7½ av. |
| 2/ | 1 8 | | | |
| | 1 4 | | | |
| | 6 0 | 26 8 | B. G. stone. | Jambs in eight stones. |
| 2/ 8/ | 1 8 | | | |
| | 1 4 | 35 7 | Beds. | |

| | | | | |
|---|---|---|---|---|
| 2/ | 1 4 | | | |
| | 6 0 | 16 0 | ½ joint<br>and<br>P. F. | Front 8<br>Back 11<br>19 |
| 2/ | 1 7 | | | |
| | 6 0 | 19 0 | P. F. | |
| 2/ | 10 | | | |
| | 6 0 | 10 0 | S. F.<br>and<br>Rough sunk F. | Front chamfer. |
| 2/ | 4 | | | |
| | 6 0 | 4 0 | S. F. | |
| | 5 | | | |
| | 1 0 | | | |
| | 6 0 | 2 6 | B. G. stone scantling. | Mullion. |
| 2/ | 1 0 | | | |
| | 5 | 10 | Bed. | 1 0<br>1 0<br>5<br>5<br>2 10 |
| | 2 10 | | | |
| | 6 0 | 17 0 | P. F. | |
| 4/ | 4 | | | |
| | 6 0 | 8 0 | S. F. | |
| 2/ | 2/ | 4 | 3″ × 1″ × 1″ slate dowels, mortises, and Ct. | |

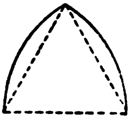
The stone out of which each piece of tracery is obtained is indicated by dotted lines on the drawing.

| | | | | |
|---|---|---|---|---|
| 2/ | 1 1 | | | |
| | 1 4 | | | |
| | 2 8 | | | |
| | | 7 8 | B. G. stone. | |
| | | | | Lowest stone of arch. |
| 2/ | 1 9 | | | ① |
| | 1 4 | | | |
| | 2 0 | | | |
| | | 9 4 | | ② |
| 2/ | 1 11 | | | |
| | 1 4 | | | |
| | 1 8 | | | |
| | | 8 6 | | ③ |
| 2/ | 8 | | | |
| | 1 4 | | | |
| | 1 2 | | | |
| | | 2 1 | | ④ |
| 2/ | 8 | | | |
| | 1 4 | | | |
| | 1 7 | | | |
| | | 2 10 | | ⑤ |
| | 2 0 | | | |
| | 1 0 | | | |
| | 2 3 | | | |
| | | 4 6 | | ⑥ |
| 2/ | 2 1 | | | |
| | 1 0 | | | |
| | 1 1 | | | |
| | | 4 6 | | ⑦ |
| 2/ ½/ | 5 10 | | | |
| | 11 4 | | | |
| | | 70 1 | P. F. | |
| | | | | Front and back. |

The foregoing dimension is that of a triangle the apex of which is marked *a* and is assumed to be equal to the surface of the head. If the surveyor is doubtful of his judgment in this manner he may inscribe a triangle in the head and calculate the segments of the circle forming the remainder, as sketch.

14
8
8
8
8
11
11
8
8
8
——
10) 92
——
9⅛

FIG. 42.



2/ 10/ 10
1 4
—— 13 4 Sk. joints.

Collected and averaged.
Stones 1, 2, 3, 4, 5.
2/ 5 = 10
2/ 11 = 22
2/ 7 = 14
7
——
7) 53
——
7½

2/ 7/ 8
1 0
—— 9 4 Sunk joints.

To tracery.

1 0
5
—— 5 Joint.

Over mullion.

2/ 8 9
1 4
—— 23 4 Circular joint.

Back of arch

13/ 2/ 26 Slate dowels, mortises, and Ct. a. b.

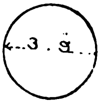
| | | | | |
|---|---|---|---|---|
| | | | | Width = 4 11 |
| | | | | Depth of sinking { 4<br>4 |
| | | | | 5 7 |
| ½/ | 5 7<br>9 4 | 26 1 | S. F. stopped<br>and<br>Ro. sunk F. | |
| | | | | Front of tracery. |
| 2/ | 8 2<br>6 | 8 2 | S. F. circular stopped in tracery. | |
| | | | | Outer splay of arch. |
| | 6 | 6 | Mitre to splay. | |
| | 3 6<br>2 6 | 8 9 | Ddt. S. F. stopped. | |
| | | | | The lower part of tracery where the thinner stone occurs. |
| 1/ | | 1 | Labour triangular perforation 5″ × 5″ extreme through 12 in. stone. | |

Over mullion.

| | |
|---|---|
| Head of light .. .. .. | 4 2 |
| Eye next arch .. .. .. | 2 11 |
| ½ triangle at top .. .. .. | 3 2 |
| ½ eye over mullion .. .. | 8 |
| | 10 11 |

| | | | | |
|---|---|---|---|---|
| 2/ | 10 11<br>1 0 | 21 10 | S. F. circular stopped in tracery. | |
| | | | | 12 in. stone. |
| 12/ | 1 0 | 12 0 | Mitre to splay. | |
| | | | | 3 3<br>3<br>3 |
| | | | | 3 9 |

2/



22 0 S. F. stopped.

Faces of cusped circle

| | | | |
|---|---|---|---|
| 6/ | 6 | | Labour to triangular perfs. 3″ × 3″ extreme, through 6 in. stone.<br>Eyes. |
| 6/ 3/ | 6 | 9 0 | Mitre to splay. |
| | | | Eyes 6/ 9 = 4 6<br>Cusps 6/ 2 1 = 12 6<br>17 0 |
| | 17 0<br>. 6 | 8 6 | S. F. circular stopped in tracery. |
| 12/ | 6 | 6 0 | Mitre to splay. |
| | | | 2/ 4 8 = 9 4<br>3 10<br>2/ 6 4 = 12 8<br>11 0<br>9 11<br>46 9 |
| 2/ | 46 9 | 93 6 | Circular sunk and stopped moulding, 4 in. girth in tracery.<br>Inside and outside. |
| 2/ 14/ | 6 | 14 0 | Mitre to moulding.<br>Average of long and short. |
| 2/ 6/ | 2 0 | 24 0 | Moulding as last, 2 in. girth.<br>Eyes in foiled circle. |
| 2/ 6/ | 2 3 | 27 0 | Foils. |
| 2/ 6/ 3/ | | 36 | Mitre to 2 in. Mo.<br>Eyes. |
| 2/ | 2 0 | 4 0 | Stopped rebate 5 in. girth, including stops.<br>On sill. |
| 2/ | 2 0 | 4 0 | Stopped groove 1 in. wide and ½ in. deep, incg. stops.<br>For condensation. |

| | | | |
|---|---|---|---|
| 2/ | 1/ | 2 | ½ in. perforations 9 in. long, as eject. |
| 2/ 2/ | 6 1 | | |
| | | 24 4 | Groove for lead lights<br>and<br>Pointing both sides with mastic cement. |
| 2/ | 4 2 | | |
| | | 8 4 | Ditto, circular in tracery. |
| | 1 5 | | |
| | | 1 5 | |
| 2/ | 3 0 | | |
| | | 6 0 | |
| 6/ | 2 1 | | |
| | | 12 6 | |
| 6/ | 8 | | |
| | | 4 0 | |
| | 6 3 | | |
| | | 6 3 | |
| 2/ 4/ | 2 1 | | |
| | | 16 8 | ½″ × ½″ galvanized iron saddle bar. |
| 2/ 4/ | 2/ | 16 | Mortises for saddle bars and cement. |
| | 1/ | 1 | Ring 18 in. diar. of saddle bar as before, with six points. |
| | 6/ | 6 | Mortises and cement a. b. |
| 2/ | 2 1 | | |
| | 6 1 | | |
| | | 25 4 | Stout lead quarry lights, secured with strong copper bands to saddle bars, and glazing with rolled cathedral glass in varied tints (to be approved), with border of plain white glass. |
| 2/ | 2 1 | | |
| | 1 10 | | |
| | | 7 8 | Ditto, in cusped heads, and tracery measured square. |
| | 6 | | |
| | 5 | | |
| | | 3 | |
| 2/ | 7 | | |
| | 1 3 | | |
| | | 1 6 | |
| 6/ | 3 | | |
| | 4 | | |
| | | 6 | |

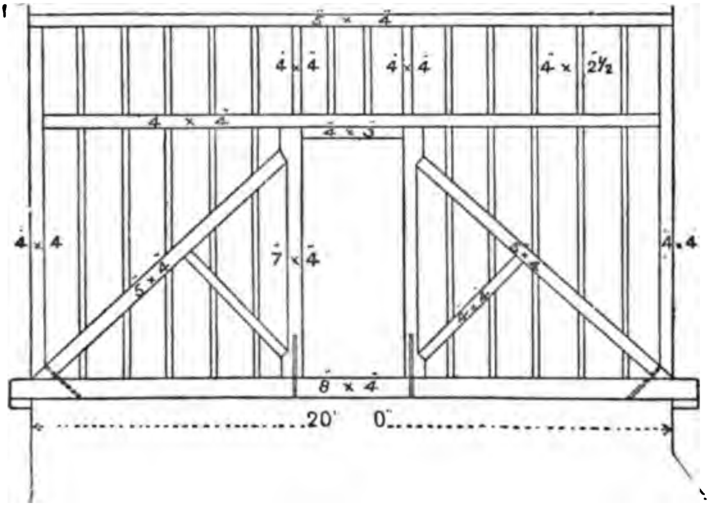
| | | | |
|---|---|---|---|
| | 1 6 | | Ditto, ditto. |
| | 1 6 | 2 3 | |
| 6/ | 11 | | |
| | 11 | 5 1 | |
| | 2 2 | | |
| | 1 10 | 4 0 | |

If the stone in a traceried head is all of one thickness, the stone may be taken in one dimension, unless the tracery is unusually open; the quantity of stone resulting from this method will be sufficiently near for all practical purposes. To take the foregoing as an example, and assuming the thickness to be 12 inches, the dimensions would be as follows:—

| | | | |
|---|---|---|---|
| ½/ | 5 10 | | |
| | 1 0 | | |
| | 11 4 | 33 1 | B. G. stone in tracery. |

*A Quarter Partition.*

Fig. 43.



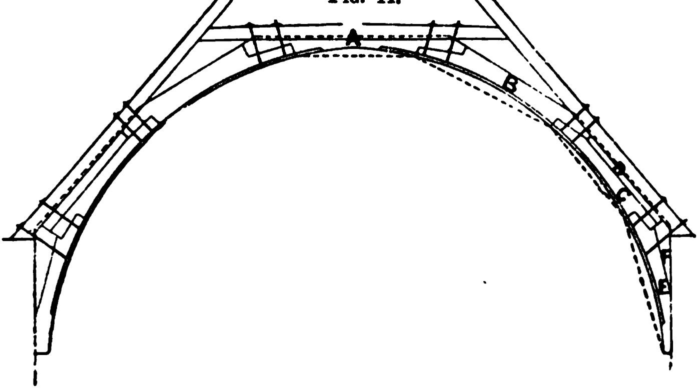
| | | | |
|---|---|---|---|
| 2/ | | 2 | 14" × 9" × 3" York templates, tooled where exposed.<br>Partition south of B.R. 4. |
| 2/ | | 2 | Ends of timbers. Cut and pinned. |
| | | | 20 0<br>9<br>9<br>21 6 |
| | 21 6<br>8<br>4 | 4 9 | Fir framed in trussed partition.<br>Tie beam. |
| | | | Head 21 6<br>Queens. { 8 6<br>8 6<br>38 6 |
| | 38 6<br>7<br>4 | 7 6 | Add. |
| 2/ | 10 9<br>5<br>4 | 3 0 | Add.<br>Principals. |
| 2/ | 4 9<br>4<br>4 | 1 1 | Add.<br>Struts. |
| | 3 7<br>4<br>3 | 4 | Add.<br>Straining piece. |
| 2/ | 1/ | 2 | ¾-in. W. I. bolt 17 in. long, with head, nut, and washer, and fixing by carpenter.<br>Heel bolts. |

| | | | | |
|---|---|---|---|---|
| | | | | 2 0<br>2 0<br>4<br>4 4 |
| 2/ | 4 4 | 8 8 | 2" × ½" W. I. strap, incg. perforations, and fixing by carpenter. | |
| 2/ | 1/ | 2 | Sets of W. I. gibs and keys. | |
| | | | | Posts 2/ 11 6 = 23 0<br>Intertie 20 0<br>Posts { 3 6<br>3 6<br>50 0 |
| | 50 0<br>4<br>4 | 5 7 | Fir frd. a. b. | |
| | | | | 10/ 11 6 = 115 0<br>2/ 3 6 7 0<br>122 0 |
| | 122 0<br>4<br>2½ | 8 6 | | |

**Quarters.**

*A Circular Rib to a Roof Truss.*

FIG. 44.

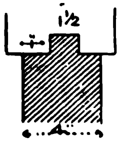


| | | | | |
|---|---|---|---|---|
| | 14 3<br>1 2 | 16 8 | 4-in. fir framed and wrought in circular rib. | Piece A. |
| 2/ | 12 3<br>1 9 | 42 11 | 4-in. do. out of timber 21 in. deep. | B. |
| 2/ | 9 3<br>1 7 | 29 4 | 4-in. do. out of do. 19 in. deep. | C. |
| 2/ | 7 4<br>7 | 8 7 | 4-in. fir as first. | D. |
| 2/ | 9 6<br>2 1 | 39 7 | 4-in. do. out of 25 in. deep. | E |
| 2/ | 5 6<br>1 3 | 13 9 | 4-in. fir as first. | F. |

Describing the timber as wrought gives an excess on the planing, but does not usually increase the builder's price. The word wrought can however be omitted, and the net quantity of the planing measured, if that course be preferred.

| | |
|---|---|
| 1½ | 12 6 |
| 1 | 9 9 |
| 1 | 9 9 |
| 3½ | 32 0 |

FIG. 45.



| | | |
|---|---|---|
| 32 0 | 32 0 | Labour stopped groove 3½ in. girth in fir, incg. stops. (Edge of rib grooved into collar and principal rafter.) |

| | | | |
|---|---|---|---|
| 2/ | 32 0 | 64 0 | Labour to rebate 2¼ girth. |
| | | | Between **A** and **B** = 3 10 |
| | | | „ **B** and **C** = 3 6 |
| | | | „ **C** and **E** = 4 0 |
| | | | 11 4 |
| 2/ | 11 4 | 22 8 | Grooved and rebated joint and dowelling with oak dowels. |
| 2/ | 7 4 | 14 8 | Between C and D |
| 2/ | 5 3 | 10 6 | Between E and F |
| | | | 2 4 |
| | | | 2 10 |
| | | | 2 7 |
| | | | 2 6 |
| | | | 3 1 |
| | | | 3 9 |
| | | | 6) 17 1 |
| | | | 2 10 |
| 2/ | 6/ | 12 | ¾-in. W. I. bolts, average 2 ft. 10 in. long with head, nut, and washer, and fixing by carpenter. |
| 2/ | 6/ | 12 | Labour heads of bolts let in fir and "pelleted" or "covered." |
| | 58 6 | 58 6 | Labour circular sunk and sawn edge to 4-in. fir. |
| 2/ 2/ | 25 3 | 101 0 | Labour to stopd. chamfer 2 in. wide circular. |
| 2/ 2/ | 2/ | 8 | Splayed stops. |

## *Doors.*

Doors of various heights or widths may often be averaged with advantage where one of the dimensions is the same in each case; thus a number of doors 7 feet high and of various widths as follows:—

| | | | |
|---|---|---|---|
| Bedroom No. 2 | 2/ | 2 6 | = 5 0 |
| Housemaid's closet | | | = 3 0 |
| Bedroom No. 4 | 2/ | 2 9 | = 5 6 |
| „ No. 5 | 2/ | 2 10 | = 5 8 |
| | | | 7) 19 2 |
| | | | Av. 2 9 |

7/ 2 9
7 0
—— 134 9 2-in. four-panel sqr. doors.

4
Grain & 2^ce^ Varnish.

7 0
7 0
2 9
4/1¼ 5
17 2

7/ 17 2
6
—— 60 1 1¼ in. double rebated jamb linings, tongued at angles.

4
Grain & 2^ce^ Varnish

17 2
4/3" = 1 0
18 2

7/ 2/ 18 2
—— 254 4 3" × 1¼" moulded architrave
and
3" × 1" framed and splayed grounds plugged.

4
Grain & 2^ce^ Varnish

Sometimes the difference in length between grounds and architraves is so small that it is assumed to be the same, and they are taken together, as in the foregoing dimensions.

### *Staircases.*

The space shown on a general drawing as occupied by a staircase is from outside to outside of strings.

As the measurement of wreathed lines will often be requisite in dealing with handrails, strings, &c., and may perhaps be puzzling to inexperienced persons, see the following example:—Measure the length on plan (say 3 feet) and find the rise (say 2 feet), set out 3 feet as the base of a triangle, and 2 feet as the perpendicular, and the hypothenuse will be the required length.

Fig. 46.

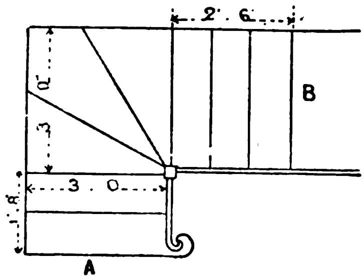
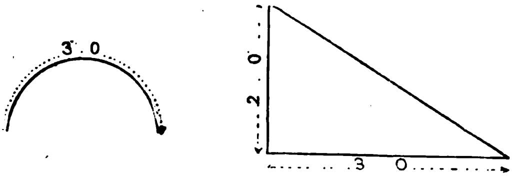


Fig. 47.



Although the length of the treads minus the strings would be a trifle less than 3 feet, as each housing would be less than ¼ of an inch, it is usual to take the whole length as follows:—

Assuming the height from A to B to be 4 feet 6 inches.

| | | |
|---|---|---|
| Treads | 1 | 8 |
| | 2 | 6 |
| Risers | 1 | 0 |
| | 2 | 0 |
| Nosing 5/1″ | | 5 |
| | 7 | 7 |

| Dimensions | Squaring | Description |
|---|---|---|
| 3 0<br>7 7 | 22 9 | 1¼-in. deal treads, with rounded nosings and 1-in. risers glued, blocked, and bracketed, all tongued together on and including two strong fir carriages, and prepared for cut strings. |
| | | Fliers. |
| 3 0<br>3 0 | 9 0 | 1¼-in. do., cross-tongued winders, measured net. |
| | | Treads. |

| | |
|---|---|
| | 3 0 |
| 6 | 3 6 |
| 1 | 3 6 |
| 7 | 10 0 |

| Dimensions | Squaring | Description |
|---|---|---|
| 10 0<br>7 | 5 10 | Add. |
| | | Risers. |
| 1/ | 1 | Extra labour and materials. Curtail end to bottom step and veneered front to riser, the step 3 ft. 6 in. long. |
| 3 0 | 3 0 | 4″ × 1¼″ rounded nosing and tongueing to edge of floor. |
| | | At top. |

Or the fliers may be measured by single steps, thus:—

| | | |
|---|---|---|
| Tread | 10 | |
| Riser | 6 | |
| Nosing | 1 | |
| | — | |
| | 17 | |

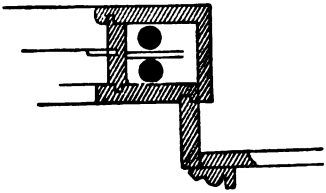
| | | | |
|---|---|---|---|
| 5/ | 3 0 | | |
| | 1 5 | | |
| | —— | 21 3 | |

The way first described usually makes fewer dimensions.

| | | |
|---|---|---|
| 6/ | 6 | Housings of steps. |
| 3/ | 3 | Do. winders. |
| 4/ | 4 | Mitred and returned nosings to steps. |
| 2/ | 2 | Ends of treads notched and fitted to newel. |
| 3/ | 3 | Do. winders. |

### *Square-headed Sashes and Frames in* 14-*inch Wall.*

Fig. 48.



Begin with the size of the external opening "3′ 0″ × 6′ 0″."

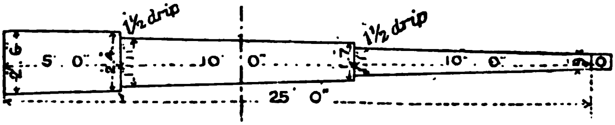
| | | |
|---|---|---|
| 3 9 | | |
| 6 3 | | |
| —— | 23 5 | Deal-cased frames O.S. and weathd. sills, 1-in. inside and outside linings, 1¼ pulley stiles, ⅜-in. back linings, and 2-in. moulded sashes double hung with best No. . . . flax lines, best brass axle pulleys, and iron weights, and the frame grooved all round for finishings. |
| 4/ | 4 | Extra for moulded horns to 2-in. sashes. |
| 3 9 | | |
| —— | 3 9 | 1⅛″ × ⅛″ galvd. W. I. tongue in white-lead,<br>and<br>Groove in oak,<br>and<br>Groove in York stone. |

| | | | |
|---|---|---|---|
| 1/ | 1 | Strong brass spring sash-fastening. | |
| 2/ | 2 | Brass sunk sash lifts. | |
| 2 10<br>5 6 | 15 7 | B. P. P. | |
| | | | 2 squares.<br>Length of outer edge of frame. 3 9<br>6 3<br>6 3<br>16 3 |
| 16 3<br>5 | 6 9 | 1-in. rebated linings, tongued at angles. | |
| | | | 16 3<br>8<br>16 11 |
| 16 11 | 16 11 | 2" × 1¼" moulded architrave and mitres. | |
| | | | 16 3<br>1 0<br>17 3 |
| 17 3 | 17 3 | 3" × 1" framed and splayed grounds. | |
| | | | 3 9<br>2¼<br>2¼<br>4 2 |
| 6<br>4 2 | 2 1 | 1¼-in. rounded and rebated window board and bearers. | |
| 2/ | 2 | Notched, returned, and mitred ends. | |
| | | | Height of frame 6 3<br>Width on one ground 3<br>6 6 |
| | | | Width of frame and grounds 3 9<br>6<br>4 3 |
| 4 3<br>6 6 | 27 8 | Ddt. R. F. and S. walls,<br>and<br>Paper at 2s. per piece. | |

| | | | |
|---|---|---|---|
| 2/ | 2 | Frames. | ④ |
| 4/ | 4 | Sheets. | ④ |

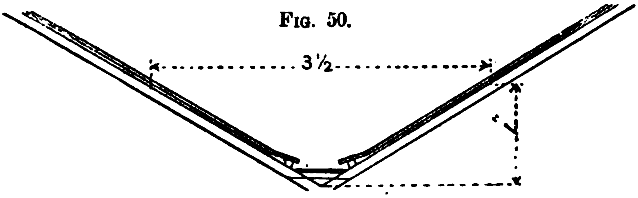
*A Gutter.*

FIG. 49.



The width of gutters must always be calculated, as they are frequently incorrectly drawn; when the distances apart of the drips are equal, long lengths may be taken together, and the width may be averaged, but not otherwise, for when the drips are at unequal distances the average will not be a true one, and considerable error will result; nevertheless, in a large number of gutters of similar character the probability is that errors will neutralise each other.

FIG. 50.



First find out the increase of width for every inch of rise (see dotted lines on diagram). In this instance the rise is 1¼ inch in 10 feet, and the increase of width for each inch of rise 3½ inches.

9
1 1
2) 1 10
11

| | | | |
|---|---|---|---|
| A. | 10 1<br>11 | 9 8 | 1-in. deal gutter-boards and framed bearers. |
| B. | 10 1<br>1 9 | 17 8 | |
| C. | 5 1<br>2 5 | 12 3 | |

1 7
1 11
2) 3 6
1 9

2 4
2 6
2) 4 10
2 5

| | | |
|---|---|---|
| 2/ | 2 | Short lengths of 1¼-in. cross rebated drip. |
| 1/ | 1 | 1½-in. deal dovetailed cesspool 9″ × 9″ × 6″, all in clear, holed, and fitted. |

| | | |
|---|---|---|
| | 10 | 0 |
| At drip | | 3 |
| At cesspool | | 2 |
| | 10 | 5 |

| | |
|---|---|
| Sole of gutter | 11 |
| Turn up | 9<br>9 |
| | 29 |

| | | | |
|---|---|---|---|
| A. | 10 5<br>2 5 | 25 2 | 6-lb. lead gutter. |
| B. | 10 6<br>3 3 | 34 2 | |

| | | | | |
|---|---|---|---|---|
| | 10 | 0 | 1 | 9 |
| At drip | | 3 | | 9 |
| | | 3 | | 9 |
| | 10 | 6 | 3 | 3 |

|  |  |  |
|---|---|---|
|  | 5 0 | 2 5 |
| Turn up | 9 | 9 |
| At drip | 3 | 9 |
|  | 6 0 | 3 11 |

|  | Dimensions | Squared | Description | Side notes |
|---|---|---|---|---|
| C. | 6 0<br>3 11 | 23 6 | 6-lb. lead gutter. |  |
|  | 10<br>10 | 8 |  | Cesspool bottom.<br>6 1 1 = 8 |
|  | 3 1<br>8 | 2 1 |  | 3 0 1 = 3 1<br>Ditto sides. |

|  |  |  |
|---|---|---|
| 1/ | 1 | Extra labour and solder to cesspool. |
| 1/ | 1 | 24 in. length of socket pipe out of 7-lb. lead all bent, one end tafted and soldered to cesspool. |
| 1/ | 1 | Stout copper wire cover to cesspool. |
| 1/ | 1 | Perforation in 1½ Bk. wall for socket pipe, and making good. |

*The Method when the Drips are at equal Distances.*

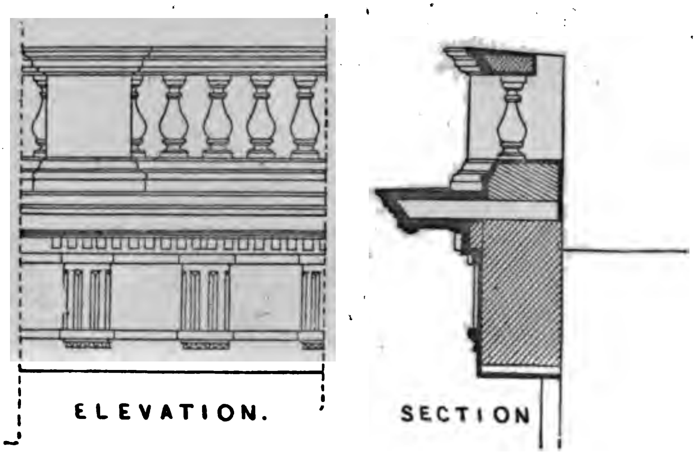
|  |  |  |
|---|---|---|
| 2 6 |  | 25 0 |
| 9 | Passings 3/1 | 3 |
| 3 3 |  | 25 3 |
| 1 7½ |  |  |

|  |  |  |
|---|---|---|
| 25 3<br>1 8 | 42 1 | 1″ gutter board and bearers. |

It will be seen, by comparison with the former dimensions, that in this case the result is too great.

*A Balustrade and Cornice in Portland Cement and Brick.*

FIG. 51.



| | | | |
|---|---|---|---|
| 4 9<br>3 0 | 14 3 | 1½ Bk. in Ct. | Frieze and cornice. |
| 1 8<br>6 | 10 | ½ Bk. in Ct. | Projection base of pedestal. |
| 1 2<br>1 9 | 2 1 | 1¾ Bk. in Ct. | Pedestal. |
| 4 9<br>3 | 1 2 | 1 Bk. in Ct. | Capping. |
| 1 11<br>3 | 6 | ½ Bk. in Ct. | Projection for pedestal. |
| 4 9<br>6 | 2 5 | ½ Bk. in Ct. | Projection for bed mould. |

| | | | |
|---|---|---|---|
| | 4 9 | | |
| | 2 5 | 11 6 | 4-in. rough York core, and bedding and jointing in Ct. |
| | | | Cornice. |
| | 4 9 | 4 9 | Roughly splayed edge to 4-in. York. |
| 2/ | 4 9 | 9 6 | Ro. splay one course of bkwk. |
| 2/2/ | 5 | 1 8 | |
| | | | Capping and base of balustrade, &c. |
| | 4 9 | | |
| | 1 2 | 5 7 | 3-in. Ro. York core, and bedding and jointing in Ct. |
| | | | Soffit of architrave. |

*All in Narrow Widths.*

| | | | |
|---|---|---|---|
| | 1 4 | | |
| | 1 9 | 2 4 | P. F. in Portland Ct. on brick. |
| | | | Back of pedestal. |
| | 3 5 | | |
| | 4 | 1 2 | P. F. |
| | | | Back of capping. |
| | 4 9 | | |
| | 1 6 | 7 2 | P. F. |
| | | | Back of base. |
| 2/ | 4 | | |
| | 4 | 3 | P. F. |
| | | | Returns of pedestal at top. |
| | 1 4 | | |
| | 5 | 7 | Weathering, including dubbing. |
| | | | Top of pedestal. |
| | 2 2 | | |
| | 1 5 | 3 1 | Add. |

D°

| | | | | |
|---|---|---|---|---|
| | | | | 4 9<br>Ddt. 2 2<br>2 7 |
| | 2 7<br>1 1 | 2 10 | Add. | Top of capping. |
| | 4 9 | 4 9 | Moulding 6 in. girth. | Front. |
| 2/ | 5 | 10 | Ditto, in short lengths. | Returns. |
| 4/ | | 4 | Mitres to 6 in. moulding. | |
| | | | | 1 5<br>1 5<br>1 4<br>4 2 |
| | 4 2<br>1 8 | 6 11 | P. F. | Front and return of pedestal. |
| | 4 9 | 4 9 | Mouldg. 6 in. g. in S. L. a. b. | Base of balustrade. |
| 2/ | 5 | 10 | Ditto, in short lengths. | Returns. |
| 4/ | | 4 | Mitres to 6-in. moulding. | |
| | | | | 4 9<br>4½<br>4½<br>5 6 |
| | 5 6<br>3 | 1 5 | P. F. a. b. } Base. | |
| | 3 4<br>1 1 | 3 7 | | |
| | 3 4<br>8 | 2 3 | | |
| | | | | Soffit of capping. |

| | | | | |
|---|---|---|---|---|
| 2/ | 4 9 | 9 6 | Arris part in short lengths. | |
| | | | | **Capping.** |
| 2/ | 4 | 8 | | |
| 2/ | 4½ | 9 | | |
| 2/ | 3 5 | 6 10 | | |
| 2/ | 3 5 | 6 10 | | |
| | | | | **Base.** |
| 2/ | 1 8 | 3 4 | | |
| | | | | **Vertical to pedestal.** |
| 2/ | 1 5 | 2 10 | | |
| 2/ | 3 | 6 | | |

NOTE.—When, as in the above case, a distinction is necessary, but the difference of value for short lengths is small, you may say "part in short lengths."

| | | | |
|---|---|---|---|
| 4 9<br>1 7 | 7 6 | Weathering and dubbing a. b. | |
| | | | Cornice. |
| 1 10<br>4 | 7 | Ddt. do. | |
| | | | **For base of pedestal.** |
| 4 9 | 4 9 | Arris. | |
| 4 9<br>2 6 | 11 11 | Moulding. | |
| | | | Cornice measured from top of frieze to edge of weathering. |
| 4 9 | 4 9 | Dentil course of blocks 2 in. wide, 3½ in. high, 1 in. apart, 2 in. projection. | |
| 4 9<br>1 2 | 5 7 | P. F. a. b. | |
| | | | **Frieze.** |

**2/ 2 Cast Doric triglyphs, 10 in. wide, 18 in. high, and 1 in. projection, and including modelling, fixing and m. g.**

**1/ 1 Half do. and do.**

**1 0**
**1 0**
**7**
**——**
**2 7**

**2 7**
**—— 2 7 Moulding 3-in. girth in short lengths.**

**Fillet between lower part of triglyphs.**

**10/ 10 Mitres.**

**6**
**1 0**
**——**
**1 6**

4 9
1 6
—— 7 2 P. F. a. b.

Fascia.

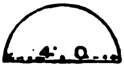
4 9
—— 4 9 Arris.

4/ 4 Cast moulded balusters, 6 in. extreme diameter, and 17 in. high, including modelling and fixing and m. g.

2/ 2 Half do., and fixing against pedestal and m. g.

### *An Archway in Keene's Cement* (Fig. 52).

2/ 4 0
7 0
—— 56 0 } Ddt. R. F. and S.



2/ 12 6 }

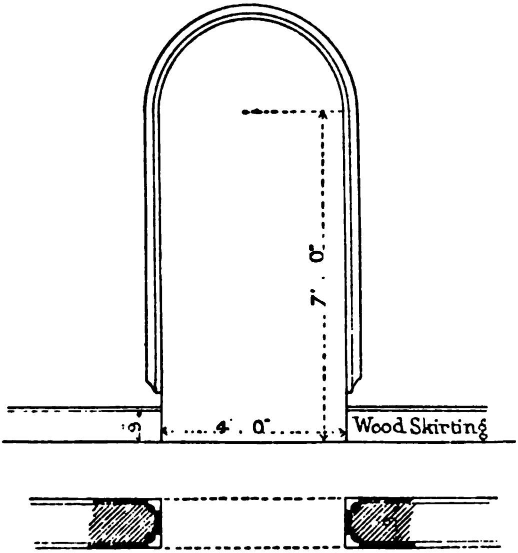
2/ 6 3
9
—— 9 5 Keene's Ct. P. F. in N. W.

(The width usually allowed is equal to thickness of wall.)

6 4
9
—— 4 9 Do. circular.

| | | |
|---|---|---|
| 2/ 9 | 1 6 | Junction of circular and straight. |
| 2/2/ 6 0 | 24 0 | K. C. mo. 5 in. girth<br>and<br>Rough chamfer on bk.<br>(The latter only when a chamfer is required.) |

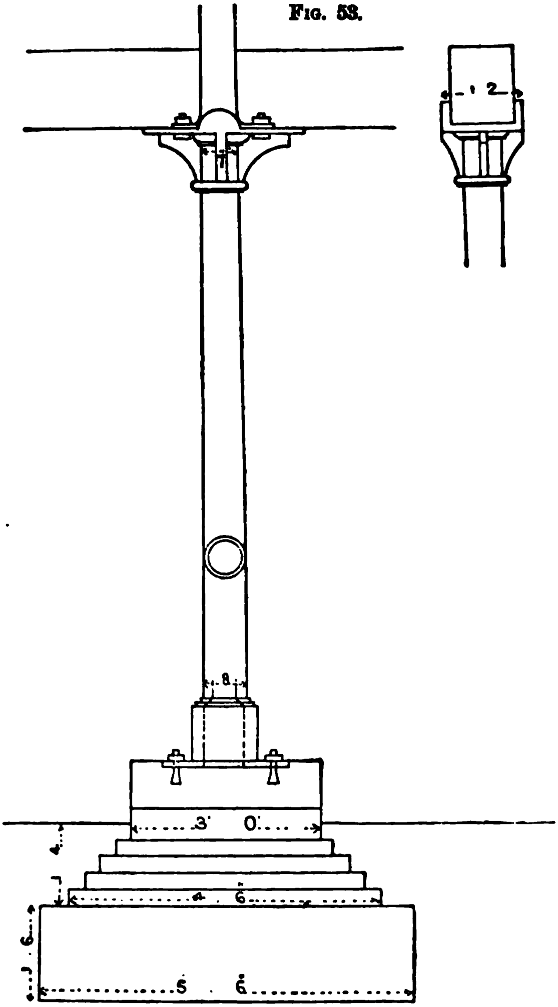
FIG. 52.



| | | |
|---|---|---|
| 2/ 7 1 | 14 2 | Do. circular,<br>and<br>Rough chamfer on brick. |
| 2/ 2/ | 4 | Junction of circular and straight mo. in K. C. |
| 2/ 2/ | 4 | Moulded stops to 5-in. moulding. |

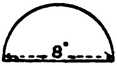
*A Cast-iron Column and its Base.*

FIG. 53.



| | | | | |
|---|---|---|---|---|
| | 5 6 | | | |
| | 5 6 | | | |
| | 1 6 | 45 5 | Concrete as desd.,<br>and<br>Excavn. and carting away. | |
| | 5 6 | | | |
| | 5 6 | | | |
| | 1 4 | 40 4 | Excavn. to trenches P. F. I. and R., and remr. carted away. | |
| | | | | 4½ B.<br>6 B. |
| | | | | 2) 10½ |
| | 4 0 | | | |
| | 1 0 | | | 5¼ |
| | | 4 0 | 5¼ bk. (avd.) | Foots. |
| | 8 6 | | | |
| | 6 | | | |
| | | 1 9 | 4 B. | |
| 1/ | | 1 | Tooled York base 3′ 0″ × 3′ 0″ × 9″, with sinking for base plate 24″ × 24″ × 1″ deep. | |

### *C. I. in one Column, and fixing at Ground Floor Level.*

| | | | | |
|---|---|---|---|---|
| | 2 0 | | | |
| | 2 0 | | | |
| | | 4 0 | 1¼-in. C. I. | Base. |
| | 2 6 | | | |
| | 1 2 | | | |
| | | 2 11 | 1-in. do. | Cap. |
| 2/ |  | 4 | 1-in. do. | Flanges. |
| 2/ | 9 | | | |
| | 5 | | | |
| | | 8 | 1-in. do. | Brackets averaged. |
| 2/ | 4 | | | |
| | 6 | | | |
| | | 4 | 1-in. do. | Ditto. |

11
7
2) 18
9 diar.

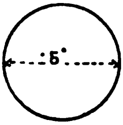
(Circumference.) 2 5
2
5 2-in. C. I.
Moulding of cap.

(Circumference.) 2 5
1½
4 2-in. C. I.
Moulding of necking.

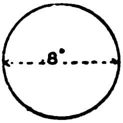
Diar. at bottom = 8
Do. at top = 7
2) 15
7½

8 11
8 11 C. I. hollow column 5½ in. intl. diar. (averaged) 1 in. metal.

Last item abstracted as taken, weight per foot run to be obtained from published tables.



2 Ddt. 1-in. C. I.
Cap.



4 Ddt. 1½ in. C. I.
Base.

Extl. = 1 0
Intl. = 8
2) 1 8
av. diar. 10

(Circumference.) 2 8
1 0
2 8 2-in. iron.
Base.

The extra thickness of iron in base is introduced for the sake of variety, the true principle in cast columns is metal of as nearly as possible the same thickness throughout.

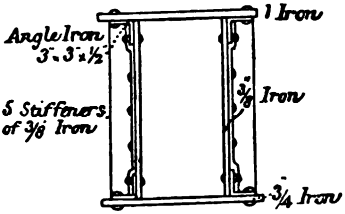
| | | |
|---|---|---|
| 4/ | 4 | 1-in. W. I. bolts 7 in. long, one end with lewis the other with nut.<br>Base. |

No washers required to bolts for ironwork.

| | | |
|---|---|---|
| 4/ | 4 | Mortises in York for lewis bolts, and lead and running. |
| 4/ | 4 | Holes rimed out in 1¼-in. C. I. |
| 4/ | 4 | ½-in. W. I. bolts 4 in. long, with head and nut.<br>Cap. |
| 4/ | 4 | Holes rimed out in 1-in. iron. |
| 1/ | 1 | Pattern to hollow, diminished column, 7½ in. average diameter, with moulded cap, four brackets, and moulded base, 10 ft. 6 in. high in all. |

*A Wrought-iron Box Girder* 25 *feet in length.*

FIG. 54.



| | | |
|---|---|---|
| 2/ | 2 | York templates tooled where exposed, 27" × 12" × 4". |
| 2/ | 2 | Stout pads 24" × 12" of boiler felt, 16 oz. to the sheet. |
| 2/ | 2 | Ends of large iron girders, cut and pinned |

| | | | |
|---|---|---|---|
| | 25 0<br>1 8 | 41 8 | 1-in. W. I. in riveted box girder, with angle irons and stiffeners, and hoisting and fixing 15 ft. from ground level, including holes and rivets.<br>Top flange. |
| | 25 0<br>1 8 | 41 8 | ⅞-in. ditto.<br>Bottom ditto. |
| 2/ | 25 0<br>1 10¾ | 93 9 | ⅜-in. ditto.<br>Webs. |
| 4/ | 25 0<br>6 | 50 0 | ½-in. ditto.<br>Angle irons. |
| 2/ 5/ | 1 11 | 19 2 | Add parallel T iron, weight 7·5 lb. per foot run.<br>Stiffeners. |
| | | | Add 5 per cent. for rivets. |

NOTE.—If it should be necessary to take out the rivets separately, proceed as follows, very rarely done:—

| | |
|---|---|
| | Rivets ¾ in. diameter for the preceding plate girder (or girders), and driving, as follows. |
| / | Rivet, including holes, through one thickness of ⅜-in. and one of ½-in. iron.<br>Angle irons. |
| / | Ditto, one thickness of ½-in. and one of 1-in.<br>Ditto. |
| / | Ditto, one thickness of ½-in. and one or ⅞-in.<br>Ditto. |
| | Ditto, two thicknesses of ⅜-in. iron.<br>Stiffeners. |

### *Painting.*

For dimensions see examples for measuring doors and linings, p. 340.

| | | | |
|---|---|---|---|
| 2/ | 134 | | ④<br>and<br>Grain and 2ce. varnish, col. |
| | 1 3 | 336 11 | |
| | 60 1 | | |
| | 1 2 | 70 1 | |
| | 254 4 | | |
| | 6 | 127 2 | |

Or if abstracted directly from dimensions of joiner they are marked as shown; see dimensions of doors, "Illustration of Averaging," page 340.

## CHAPTER XIV.

## THE PRESENT SYSTEM OF ESTIMATING.

It may not be uninteresting to note the manner in which the practice of measuring has developed into the existing system, the which, if pursued to its legitimate conclusions, will be the perfection of analysis and synthesis.

In a work of this character an exhaustive account of the process would be out of place, a few of the leading facts will be sufficient for our purpose. The student to whom the inquiry may chance to be interesting will find in Rymer, Dugdale, the Archives of the Universities, and the Record Office, interesting facts relating to the history of estimating in medieval times.

In the case of large works erected in ancient times, as churches, abbeys, colleges, and cathedrals, there is little doubt the process adopted by the ruling body was, to obtain from its own domain the stone, timber, &c., it produced, purchasing such other material as could not otherwise be obtained. The labour so far as the masonry was concerned was executed, for the most part, during the twelfth, thirteenth, fourteenth, and fifteenth centuries, by the fraternity called Freemasons, who, so far as can be known, were paid by time. The other artificers were usually paid by time, the rate per day being often regulated by Act of Parliament. Occasional instances are to be found, and they were probably frequent, wherein small contracts were made with an individual workman for particular items of work, such as single windows, doors, &c.

The next advance was to the system of contracts by separate tradesmen for the work in each trade. This method still prevails to a large extent in the Northern Counties. And in all parts of the country where a builder is ostensibly a general contractor it is frequently the case that he is merely representative of an association of the several tradesmen, who will do the work.

The division of responsibility is an evil, and the various trades are apt to spoil each other's work.

The practice of erecting a building and having it afterwards measured and valued by a surveyor, either with or without a schedule of prices previously deposited, was prevalent about the beginning of this century. When it was decided that the work should be measured and valued, the prices for a few leading items only in each trade were arranged, such as brickwork per rod, for the bricklayer, timber per foot cube for the carpenter, and the value of the remaining items of the measurement were left to be settled by the measurers at completion, the tradesman appointing one measurer and the architect or building owner the other. The great cost of work done under these circumstances has led to its gradual disuse. The client seldom knew beforehand what amount the work was likely to cost, and moreover, the uncertainty as to modes of measurement, and want of definition in the preliminary arrangements, was a frequent source of litigation. The late Mr. Edward Blore, in the erection of Worsley Hall, and a building for the Bridgewater Trust, 1839, employed a clerk of works who bought the materials and engaged and paid the workmen. A course of this kind is probably the most expensive one that it is possible to adopt. The desire of the building owner to know beforehand the amount that a work would cost, led naturally to the system of contracts by one master builder, who either prepared his own quantities or paid a surveyor for their preparation, thus each builder was put to expense which was often considerable. The increase of competition, which rendered this trouble and expense so often futile, produced the arrangement by which the builders, upon being asked to tender, met and appointed a surveyor to prepare quantities, arranging that his charges should be paid by the successful competitor. This arrangement has been gradually superseded by the present system, under which a quantity surveyor is appointed by the architect, or in the case of unusually large works, one surveyor by the architect, and another by the builders, in which case it is popularly supposed that both surveyors take off the dimensions.

The erection of a building under a schedule of prices is another way which has its advocates, but is gradually falling into disuse. There are sometimes circumstances which render any other course impossible, the objection to it is that the work always costs more, however well the schedule of prices may have been drawn, and, if ill drawn, very much more.

This practice bears some resemblance to that of the modern French architect. The method adopted for the erection of the Grand Opera House, Paris, is a fair type of the general French system of estimating. The various tradesmen in that case tendered at certain percentages below the Série Prix-de-la-Ville-de-Paris, the civic schedule of prices for builders' work. When the work is completed it is measured by a surveyor ("mètreur") employed by the tradesmen, who prepares a careful drawing of the work as executed, and the tradesman's account. These are both forwarded to the architect, who causes them to be examined by his surveyor ("vérificateur"). The scarcity of general contractors is the main reason for the estimating by each tradesman, but no doubt the system of working under a schedule of prices has found favour in the eyes of architects because of the facilities it offers for the modification of the design of a building during its erection, but the effect upon the architect must be most pernicious.

The Glasgow system of obtaining tenders was described by Mr. Honeyman in his paper, "Bills of Quantities, their proper relation to Contracts," read before the Royal Institute of British Architects, May 19th, 1879. "In Glasgow the schedules have superseded the specification altogether, and it may almost be said that a specification is never referred to in the contract at all. The architect selects the measurer, who, with the aid of the drawings and specifications, or such substitute for that as he may get, prepares a detailed schedule of quantities. Copies of this are issued by the architect to selected tradesmen, who are invited to tender by a certain day. These schedules are returned to the architect with rates filled in at each quantity, the amount extended, and the total summed up at the end. A letter accompanies, or more generally is attached to, the schedule, in which the builder offers to execute the work in accordance with the drawings, and 'to the extent of the schedule,' for the sum brought out by the addition of the extended prices, it being further provided that the whole of the work shall be measured after it is finished, and whether it turns out to be more or less than estimated, the cost shall be determined by the rates contained in the schedule; or, where these do not exactly apply, by others strictly in proportion to them. Having considered the various offers, the architect writes on behalf of the proprietor accepting the one which is preferred, and that completes the transaction; in nine cases out of ten there is no more formal contract. When the work is in progress, and when it is finished, the measurer measures it, and prepares a final measurement applying the schedule rates to the various items, and so bringing out the total sum to which the contractor is entitled. This document is examined by the architect, and if he is satisfied that it is compiled in accordance with the estimate he signs it as a final certificate. Half of the cost of the original schedule and subsequent measurement is deducted from the contractor's accounts, and the proprietor pays the full amount—that is ostensibly the half, but in reality the whole."

The practice in Edinburgh is thus stated:—

"The Edinburgh system resembles that of England in many respects, the principal differences being these:—contractors never have anything to do with the selection of the surveyor or measurer, as he is called, who is always employed by the architect; the measurer is paid by the proprietor, and the schedule is referred to in the contract. It is lodged with the architect with the various items cashed and summed up, and the rates contained in it regulate the cost of additions or omissions which may be ordered in the course of the work."

Both of these arrangements compare so unfavourably with the London practice that comment would be superfluous.

Some architects still entertain a strong prejudice against the supply of quantities by a surveyor, and uniformly endeavour to obtain tenders without them; there is very little doubt that as builders become more aware of their true interest this practice will disappear. It is surely unjust to impose upon a number of builders the trouble and expense of preparing estimates on the small chance of obtaining a contract. The builders, whose office, staff, and pecuniary position best qualify them to have quantities prepared in their own office, either refuse to tender on such conditions, or employ a surveyor to prepare them, adding his charges to their estimate. The smaller men, who are invited, prepare their own estimates, and are more frequently than not rewarded by loss; the builder who makes the greatest mistake in the way of omission being usually the successful competitor. The desire of the average client for a much larger quantity of work for his money than he has a right to have, and a fallacious idea of saving expense, has led to this extensive trading upon the incapacity of the small builder. But though the architect proposes that no quantities shall be supplied, it is frequently disposed in another manner. If the work be advertised, quantities are in most cases prepared by a surveyor ostensibly acting for a builder, who proposes to tender, and who, while preparing his quantities, takes the opportunity of offering them to the other builders who may call to inspect the drawings, and who are glad to avoid the trouble of preparing their own. Most frequently one of the men who tenders on his quantities is successful, and in the result the building owner pays much more than the charges of a practitioner employed in a regular way and loses many of the advantages which a bill of quantities, prepared under different circumstances would have afforded him. There is much need that the duties, obligations, and charges of the quantity surveyor should be authoritatively formulated, and this could be best done by the Institute of Surveyors. Although the progress towards this end had been slow, the steps which have been already taken are well calculated to effect this result.

In 1871, the general conference of architects discussed the existing condition of quantity surveyors and quantities, and appointed a committee to report upon various questions relating thereto. They circulated the following list of questions:—

### EMPLOYMENT OF SURVEYORS.

"1. Is it desirable that the practice generally adopted in the case of large works (whereby a surveyor is appointed to represent the employer and another, the builders—such surveyors being jointly responsible to the builder for the accuracy of the quantities) should be in any way modified?

"2. It was suggested, as a convenient course for general adoption, that the quantities should be prepared by a surveyor nominated by the architect, and who would be responsible to the employer for his accuracy; the builder being relieved from any responsibility in regard thereto.

"3. The adoption of this course would go far towards disconnecting the surveyor from the builder, and making him the agent and adviser of the employer in the matter of quantities, &c. Would this be a system advantageous and desirable for general adoption?

"4. A suggestion that the bills of quantities should form part of the contract was well received: architects in leading practice mentioned that they had for many years adopted such a course, and found it to work well, and to be equitable to both employer and builder. Are there any valid objections to the introduction of such a system; the dimensions on which the bills are founded being, in such a case, placed in the hands of both architect and builder?

"5. It appears to be not unusual for some architects, especially in the provinces, to furnish the bills of quantities for works to be carried out under their own superintendence. However convenient this practice may be in some instances, are not special precautions necessary? Should not the 'bills,' in such instances, *invariably* form part of the contract? And from whom should the architect receive payment for such quantities?

"6. It was mentioned as being an ordinary and reasonable course that the responsibility for the accuracy of the quantities should be thrown upon the builder, by fixing a time, say one month from the acceptance of the tender, during which he might prove the quantities, but after which no objection would be allowed. Might not great injustice be committed under such a system?

"7. It would be desirable to secure more general uniformity of practice with regard to the taking out of quantities. How can this be best attained?"

The result of the answers to these questions, and the deliberations of the committee, was the following valuable report:—

## EMPLOYMENT OF SURVEYORS: REPORT OF SPECIAL COMMITTEE, 14TH JUNE, 1872.

"The wide range of the subject, and the varied opinions which had been expressed at the conference, rendered it difficult for the committee to determine how best to proceed; after having collected a certain amount of information they prepared a series of inquiries which were circulated in the profession throughout the country, and to which sixty replies were received: these replies evince a wide diversity of opinion, arising from local circumstances and individual varieties of practice, and have satisfied your committee that for the present it will not be practicable to lay down any fixed rule for the guidance of the architect in dealing with 'quantities.' Each case must be governed by local or personal considerations, and the committee have therefore deemed it expedient to make their recommendations and expressions of opinion so general as to meet these varying conditions.

"The object to be attained by the employment of surveyors to take out the quantities of a building is to afford the builders who are to tender one uniform basis for competition; and to define, more exactly and accurately than can frequently be done by the general drawings and specification, the exact amount and nature of the work to be executed. As no employer should desire to obtain from his builder more work or greater value, and should not obtain less, than was included in the estimate, while on the other hand he should have the greatest facility to secure due allowance in the case of omission, *it would appear reasonable* that the bills of quantities, which should express in an exact form the intentions of the architect as set out in his general drawings and specification, ought to form a part of the contract, and be dealt with as a recognized exposition of the responsibilities of both employer and builder.

"The established practice in London in the case of large and public works by which one surveyor is nominated by the architect to represent the employer, and another by the builders to act for them, giving the construction of the work and the elucidation of the architect's ideas the advantage of the experience of two professional men, who consider each question from different points of view, has apparently for many years worked well; though in many cases the advantage derived from the engagement of two can only be considered nominal. There is an understanding that the surveyors so employed are responsible to the builder for the sufficiency of the quantities supplied, and the general drawings and specification prepared by the architect being sufficient, the employer is guaranteed against any excess of cost, and the builder is held safe against loss from errors of quantity. On this system your committee do not think it necessary to make further remark, although some objections have been made to it by leading members of the profession, who prefer to adopt the course next mentioned.

"Many eminent architects have adopted the course of nominating a surveyor who shall prepare the quantities on his own responsibility, and as far as the builder is concerned such quantities become practically a part of the contract. Your committee thoroughly appreciate the great advantages which the architect (and no less the employer) may derive from the employment of a surveyor acquainted with all the details of design peculiar to the architect and with his general manner of proceeding, and also how such an arrangement facilitates proceedings, when time is insufficient for the preparation of drawings and specification in such full detail as would be necessary if a stranger were employed as a surveyor. They are therefore of opinion that this system may in such cases be advantageously adopted, provided always that the builder be relieved from any responsibility as regards the quantities, and that the bills be considered as representing the work to be done. The successful working of such a system must depend entirely on the ability and position of the surveyor employed, his relation to the architect, and the extent of the confidence which the builders tendering may repose in him.

"It appears to be an ordinary custom in the provinces for the architect to supply the quantities for the carrying out of his own designs; where this is done, it should be with the knowledge and concurrence of the employer, and the quantities should form a part of the contract. The architect accepts the duty of providing the quantities, and should not attempt to evade his responsibility by throwing on the builder, as is sometimes done, the labour and risk of checking them, a course which your committee believe to be unsatisfactory, and in some cases likely to lead to great injustice.

"Your committee are of opinion that the practice of making the bills of quantities part of the contract has not been fully considered. Recognised or not, the quantities should be invariably referred to as the interpretation of the general drawings and specification, and in all cases where they are supplied to the builder by the architect, or by a surveyor in whose nomination the builder has had no part, and who is not responsible to the builder, they should form part of the contract. At the same time, when once it is admitted that these documents are to form part of the contract, the necessity for the employment of more than one surveyor in their preparation vanishes.

"The more general adoption of quantities, the extension to country work of the system of measurement usual in London, the gradual modification of local terms and usages, and, not least, the discussions consequent on such meetings as the conference, will all tend towards uniformity of practice; and as builders become more familiar with the London system of measurement, and the public better acquainted with the nature and bearings of the questions, as to the employment of surveyors, and both recognize when such acquaintance increases, the special advantages to be derived from the adoption of one or the other system of employing them, architects and surveyors will find it to the interests of their employers to adopt a uniform practice.

"H. CURREY, "W. PAPWORTH,
"C. FOWLER, "ARTHUR CATES, } *Acting Secs. to*
"J. JENNINGS, "T. M. RICKMAN, } *Committee.*"
"J. T. KNOWLES,

Various discussions have since occurred at the Royal Institute of Architects, at the Architectural Association, and at the Institute of Surveyors, at which last the discussion on the interesting paper read by Mr. Saunders, "On Quantities and Quantity Practice," is of great interest both to architects and surveyors. The paper by Mr. Rickman, on "Building Risks and their incidences," and by Mr. F. Turner, on "The Law affecting Quantity Surveyors," may also be consulted with advantage. The list of propositions read by Mr. Arthur Cates embodies, in the writer's opinion, a very just view of the relations of the quantity surveyor so far as they are at present established.

One of the questions which has much exercised the professional mind may be here briefly referred to. Shall the architect take out his own quantities? A few considerations relating thereto may tend to settle the wavering mind.

The student should first decide whether he will be an expert architect, or an expert surveyor, the average man cannot be both.

The standard of attainment in all professions is steadily rising, and all are tending in the direction of division into special branches. The varied knowledge and accomplishments in which the capable architect should excel, leaving out those parts of the work of the profession which are gravitating in the quantity surveyor's direction, are very extensive, and calculated to heavily tax the powers of the finest minds.

Further, an expert quantity surveyor is the result of long training and diligent attention, such attention as the majority of architects cannot afford to devote to that branch of the work, and it is worth the consideration of the profession how much of the success of our leading architects is referable to the fact of their association with capable quantity surveyors in whose abilily and rectitude they have trusted, and thus left themselves free to carry on the more essentially architectural parts of their work; it is a coincidence worth notice that the rising popularity of quantity surveyors has been accompanied by a notable improvement in the artistic quality of our buildings.

Various considerations have been adduced as arguments in favour of the architect's taking out his own quantities. One that it is such good practice for young architects, and probably it is, but the object of a bill of quantities is not to give young architects practice, but to save building owners and builders loss. "That it will teach him construction." The architect should learn construction thoroughly before he commences to take off quantities.

"That an architect knows what he requires in a building much better than any quantity surveyor employed by him can know." To this it may be answered that the cleverest architects frequently repeat themselves, and that a quantity surveyor who is used to a certain architect's methods of procedure can interpret his intentions with surprising accuracy.

The architect who professes to take out his own quantities, in the majority of cases, does not do so, he leaves it to a clerk, not always with happy results, and the uncertainty as to these results in some cases leads him to introduce eccentric clauses into the bill which shall protect him from possible consequences.

If the architect however prefers to prepare his own quantities, he at least owes it to all the parties concerned that they shall be workmanlike and just, and that they shall really be what they profess to be, i. e. a complete schedule of the materials and labour of every kind, and of every element of the contract which affects the price, and he will avoid such clauses as the following, which have been extracted from quantities prepared by architects.

"One month will be allowed the builder to examine the quantities, and after the expiration of that time no question will be allowed as to their accuracy."

"The drawings and specifications are open to the inspection of the builder, who may check the accuracy of the quantities, but after the tender has been accepted no question in respect of the quantities will be allowed to be raised."

"The quantities are condensed as much as possible, and allowance must be made in price for all minor matters and appurtenances, and no claim shall afterwards be made on account thereof, or for any mistake or variation therein, as the builder must include sufficient for the works to be finished complete, the quantities being net."

"Laying on water from main to cistern, pipes, ball cock, &c., complete, and all fees."

"The contractors are referred to the specification and drawings for more full explanation." Part of the "more full explanation" was the fact that the whole of the joinery described in the bill as deal was described in the specification as pitch pine.

"Reduced brickwork of hard approved stocks, including all cutting, splays, arches, external and internal, and every item of labour."

"Supply centering throughout" (a building estimated at over 8000*l.*).

Such instances might be multiplied, but they are sufficient to illustrate a kind of practice which is not uncommon, and which is preferred by some on the ground that it helps them "to dispense with unnecessary detail."

# APPENDIX.

My attention has been directed to the case of Stevenson *v.* Watson, Law Reports, Common Pleas, 148, the decision in which case it is asserted tends to reverse the previous opinions of the profession as to the responsibility of the quantity surveyor for deficient quantities, and having come into possession quite recently of facts in connection with the case which are not to be found in the law reports, I have thought it expedient to offer some considerations thereon.

The facts of the case are briefly as follows:—

Watson, architect, prepared plans and specification and supplied quantities for the public hall at Nottingham; Stevenson, builder, tendered for the work, and his tender was accepted. The contract was as follows:—

"The said Richard Stevenson and Field Weston agree to erect and build for the said company, upon a certain piece of land situate in North Circus Street, in the town of Nottingham, the temperance hall, according to the drawings, general conditions of contract, and bills of quantities, now produced and signed by the parties hereto, and intended to form parts of the agreement, and shall and will finish and complete the said temperance hall in such manner and of such materials, and within such time as is provided by the said general conditions of contract and bills of quantities, and according to the said drawings; and, further, that they, the said Richard Stevenson and Field Weston, will well and truly observe and perform all and every the said conditions and stipulations contained in the said general conditions of contract on the part of the contractors required to be observed and performed; and in consideration thereof the said company to pay unto the said Richard Stevenson and Field Weston the sum of 13,560*l.*, in the manner set forth in the said general conditions of contract, and in other respects to perform and keep the conditions and stipulations of the said general conditions of contract, so far as the same on their part is or ought to be performed and kept."

The conditions of contract contained the following clauses:—

"The general conditions of contract for artificers' works required to be done in the erection and completion of a new hall for the Nottingham Temperance Hall Company (Limited), Nottingham. Fothergill Watson, architect, Clinton Street, Nottingham, Jan. 1874.—The architect is at all times to have access to the works, which are to be entirely under his control and his clerk of the works. The architect may order any additions to or deductions from the contract without in any way vitiating the contract, and the amount of such additions to or deductions from the contract shall be ascertained by the architect in the same manner as the quantities have been measured and at the same rate as they have been priced at.

"The contractor and the directors will be bound to leave all questions or matters of dispute which may arise during the progress of the works or in the settlement of the account to the architect, whose decision shall be final and binding upon all parties.

"The contractor will be paid on the certificate of the architect."

The bill of quantities embodied the following note:—

"Note.—These quantities will, with the drawings and general conditions, form the basis of the contract. Should there be more or less measure than is here given, there will respectively be an addition to or a deduction from the contract.

"All measurements to be made in the same manner as the quantities have been taken, and all additions and deductions to be priced out at the same rate by the architect."

As the work proceeded there were many omissions and additions. The quantities proved deficient, the great discrepancy being in the brickwork and the stonework; the builder's surveyors estimated the deficiency on the brickwork alone at upwards of 400*l*. These variations the builder requested the architect to measure or have measured at convenient times, as before the striking of the scaffolds, &c., but without effect. As to the production of the bill delivered, the builder states:—"At various stages I had the building measured off by two competent surveyors, with the assistance of myself and staff, with the utmost accuracy, and priced out and measured the same way as the bill of quantities, item by item. Every care was taken to have the account correct, as I could see there would be a difficulty with the architect, and when the dimensions were squared up and the extra measurement found I had the building measured over again. The measurements were gone over and tested by me and the foremen of the different branches of the trade."

It is obvious from this statement that due care was observed in the investigation.

Stevenson, on the completion of the works, made a claim amounting to 1616*l.* 6*s.* 7*d.*, of which between 500*l.* and 600*l.* was for errors of deficiency in the original quantities, and the remainder a balance due on the contract.

The architect, without calling for any explanation of this account, certified for a balance of 251*l.* 14*s.* 4*d.*, and refused to give any explanation. Thereupon Stevenson brought his action for 1364*l.* 12*s.* 3*d.* and interest. The claim asserted that—"The defendant did not use due care and skill in ascertaining the amounts to be paid by the company to the plaintiff under the said contract, but, in ascertaining the net balance due to the plaintiff, neglected and refused to ascertain, and did not ascertain, the amount of the said additions to and deductions from the contract in the same manner as the quantities had been measured, and at the same rate as they had been priced out, or that there was more measure in the said descriptions of works than was given in the bill of quantities by making measurements in the same manner as the quantities had been taken, and neglected and refused to price out, and did not price out, the excess at the same rate, and make the stipulated additions to the contract in respect thereof, according to the terms of the contract, nor did he use due care and skill to ascertain, in the manner provided by the contract, what was, in fact, the net balance payable to the plaintiff by the company in respect of the works executed, for which the defendant was entitled to his certificate; but the defendant, knowingly or negligently, certified as aforesaid for a much less sum than was, in fact, the net balance payable to the plaintiff in respect of the works executed.

"Upon the receipt of the said certificate the plaintiff requested the defendant to inform him of the data upon which the same was based, but he refused to furnish the plaintiff with them, or to give him any information on the subject. The plaintiff thereupon requested the defendant to reconsider the said certificate, and offered to point out to him the said errors in the bill of quantities, and to give him any explanation he might require of the said accounts; but the defendant refused to reconsider the said certificate, and to allow the plantiff to point out to him the said errors in the bill of quantities, or to explain the said account, or to hear any objection whatever on the part of the plantiff to the said certificate."

The case was heard by Lord Chief Justice Coleridge and Justice Denman. Lord Coleridge said the case was one of considerable importance, and but for the intimation that had been given that whichever way the Court decided the matter would be afterwards reviewed by the Court of Appeal, he should have taken time before giving his judgment. The decision was in substance as follows:—

That the architect was in the position of an arbitrator, and therefore not liable for want of care or skill.

An action will not lie against an architect for not using due care and skill in ascertaining the amounts to be paid by a builder's employer to the builder under a contract which provides that the builder is to be paid on the certificate of the architect; that all matters of dispute are to be left to the architect's decision; that he may order any additions to or deductions from the contract; and that the amounts of such additions or deductions shall be ascertained by him at a certain fixed rate, the functions of the architect under the contract being not merely clerkly, but requiring the exercise of a judgment or opinion.

An allegation that the architect *knowingly or negligently* certified for a much less sum than was due does not disclose a cause of action, as it does not amount to a charge of *fraud*. The architect is not bound upon the application of one of the parties to reconsider his certificate, or to give reasons for it.

Leave was given to amend the claim on payment of costs, equivalent to permission to appeal against the decision. The decision was not appealed against for the following reasons:—The builder was not a rich man; he had been kept waiting for the money for his last certificate for six months; the expenses of the case had been very heavy; and the adverse judgment resulted in his bankrupty.

The decision with respect to the quantities is repugnant to any healthy sense of justice, and should not be relied upon as conclusive for the following reasons:—Permission was given to appeal. There is grave doubt as to the conclusion that an architect so placed is in the position of an arbitrator or quasi-arbitrator, he is rather in the position of a valuer, and there are several decisions which establish the right of action against a person acting in that capacity; he was, moreover, the agent of the builder for the purpose of measuring up and pricing the work. The builder actually paid him for the original quantities.

The quantities were not taken out by the architect himself, but by a man employed by him. A priced copy of the bill was deposited by the builder with the architect. The charge for the quantities was 3½ per cent.

If the legal axiom "no wrong without a remedy" have any force at all, this decision must be bad law, for this builder suffered wrong—indeed, was ruined by this action—and has had no redress. On the whole it seems fair to conclude that if the action had been brought in a different form it would probably have been successful. Scrivener *v.* Pask, referred to on p. 259, seems to indicate the course to adopt in such a case.

But if this decision is maintained, the argument against the acceptance by builders of quantities prepared by the architect acquires redoubled force. The responsibilities of the independent quantity surveyor are pretty clearly defined; if he makes errors he must pay for them, he has no such shelter; but the architect may, if this be the case, produce wild approximations to the truth, call them quantities, and, for the sake of his reputation with his employers, repudiate any liability for his errors.

It is unanimously agreed that the question of the finality of an architect's certificate should not be questioned, but the architect in the foregoing case acted in a dual capacity, as arbitrator for certain purposes and as valuer for others.

The success of the architect in this case having led to the suggestion in a recent publication that the form of contract adopted by Watson may be usefully followed, may serve as an excuse for the writing of this appendix.

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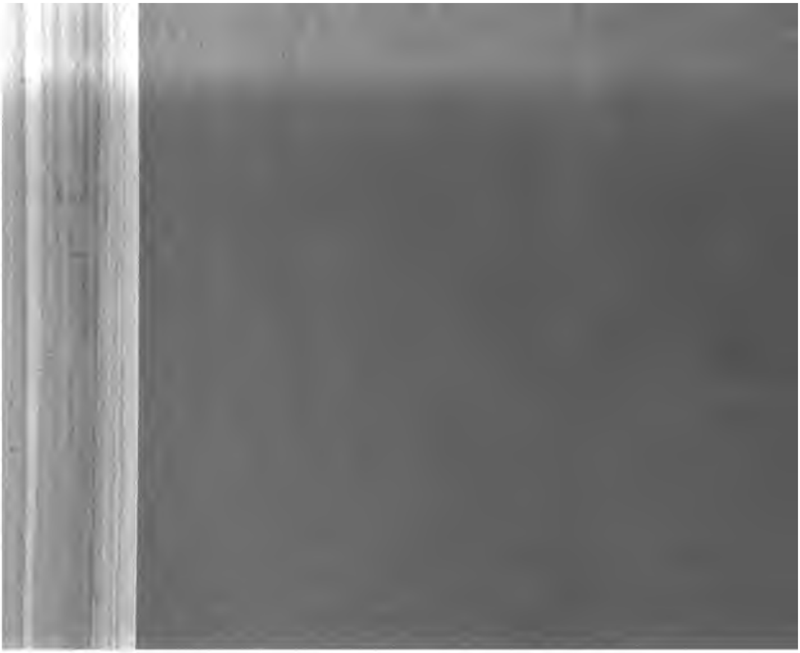

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